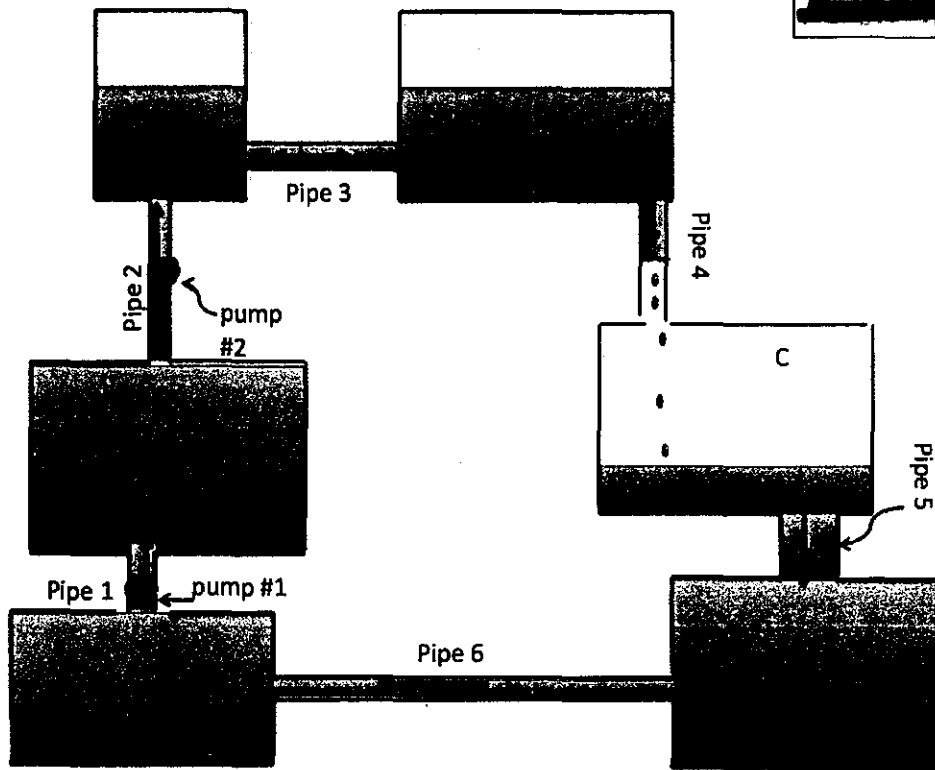


ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 1A
Student IDs of Members Present:
[REDACTED] A41986100
[REDACTED] A42772981
[REDACTED] A40175820



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	GRAV. POTENTIAL → GRAV. KINETIC	Pumping water into a lake/reservoir	GRAV. POTENTIAL → GRAV. KINETIC
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	KINETIC (ELECTRONS) → KINETIC (WATER)	Condensation	CHEMICAL POTENTIAL → THERMAL KINETIC
Pipe 4	GRAV. POTENTIAL → GRAV. KINETIC	Precipitation	GRAV. POTENTIAL → GRAV. KINETIC
Pipe 5	GRAV. POTENTIAL → GRAV. KINETIC	Infiltration of surface water into ground	GRAV. POTENTIAL → GRAV. KINETIC
Pipe 6	GRAV. POTENTIAL → GRAV. KINETIC	Discharge of ground-water into streams	GRAV. POTENTIAL → GRAV. KINETIC

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *Stored energy*

Kinetic energy: *energy caused by a movement*

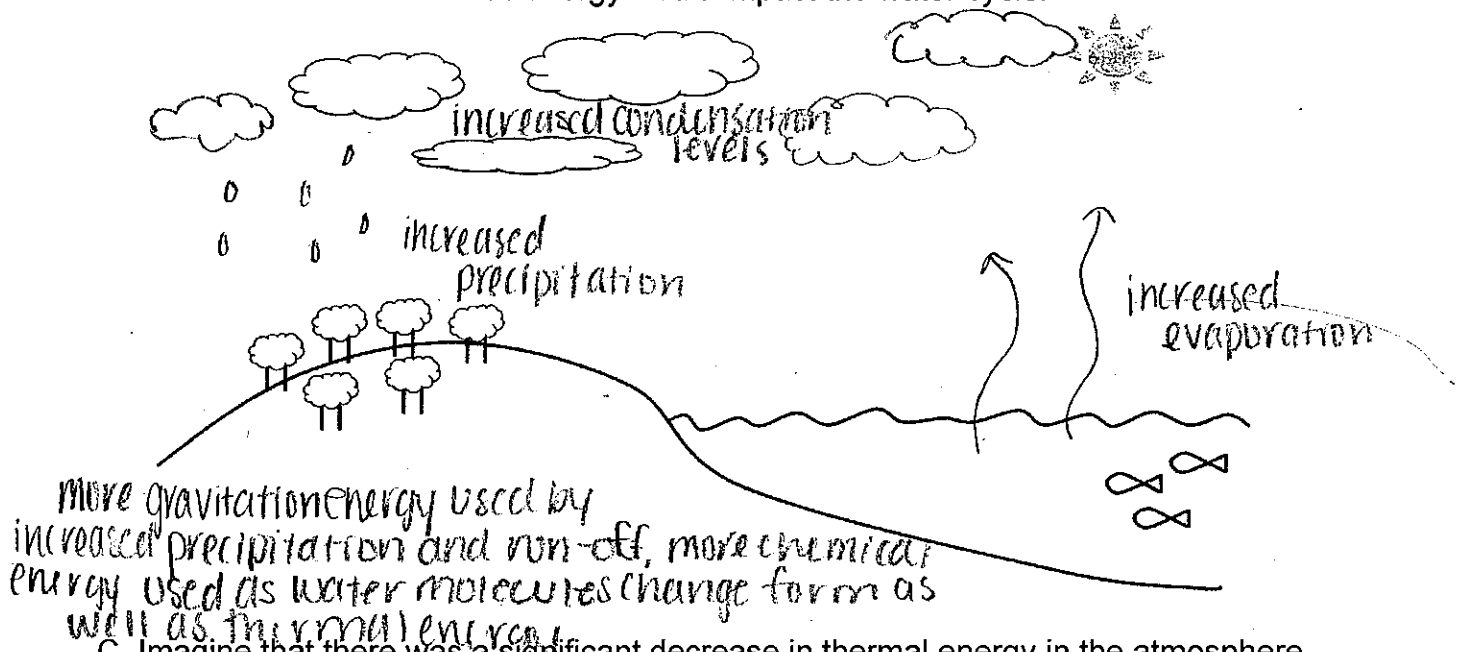
Gravitational energy: *energy caused by attraction of objects*

Thermal energy: *energy caused by molecular movement*

Chemical energy: *energy as a result of molecular arrangement*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There would be less gravitational potential energy because there would be less condensation decreasing precipitation or liquid water in clouds which will soon fall.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

All kinetic energy would cease - there would be no gravitational kinetic energy from precipitation or chemical or thermal kinetic energy from transformations

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

More energy would be required in the water cycle in order to begin evaporation and the water cycle itself.

ISP203A – Global Change, Energy
Part 2: Group Work

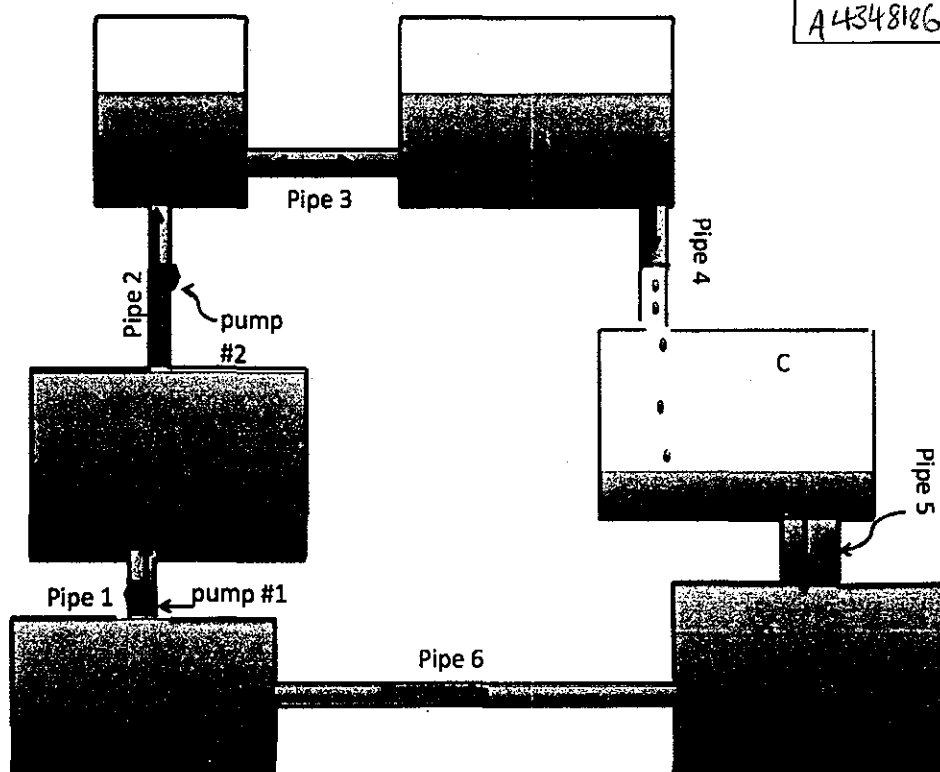
GROUP #: 2

Student IDs of Members Present:

042087601

A40741960

A43481863



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	kinetic (electrons) → Grav. Potential	Pumping water into a lake/reservoir	Thermal kinetic → Chemical Potential
Pipe/Pump 2	Gravitational Potential → Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic (electrons) → kinetic (water)	Condensation	chemical potential → Thermal kinetic
Pipe 4	Gravitational Potential → Gravitational kinetic	Precipitation	Gravitational Potential → Gravitational kinetic
Pipe 5	Grav. Potential → Grav. kinetic	Infiltration of surface water into ground	Grav. Potential → Grav. kinetic
Pipe 6	Gravitational Potential → Gravitational kinetic	Discharge of ground-water into streams	Grav. Potential → Grav. kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy of movement

Gravitational energy: The pull of objects together due to gravity

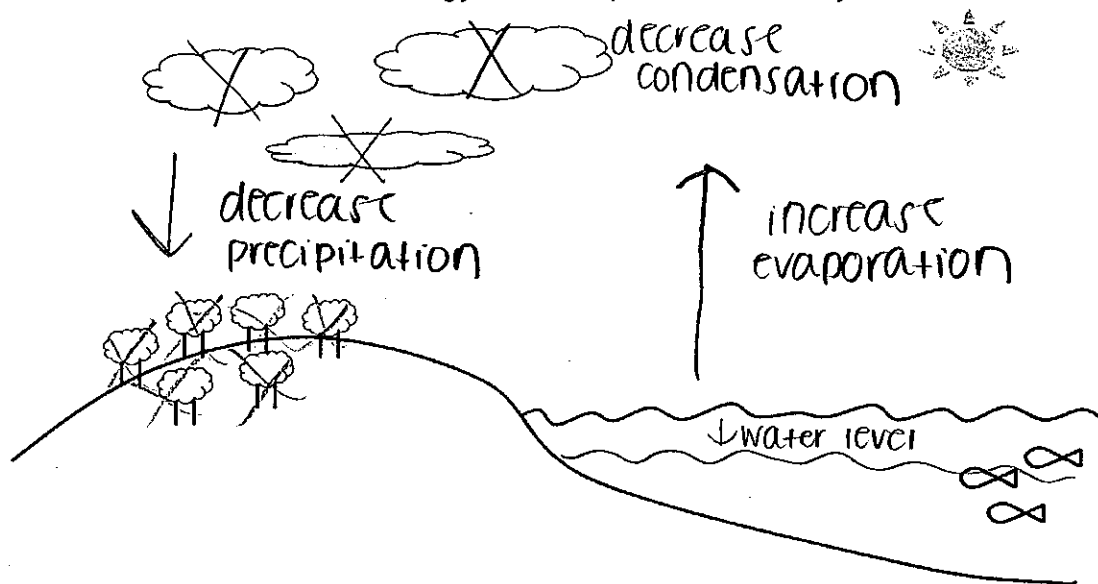
Thermal energy: The movement of molecules causing changes in temperature within the body

Chemical energy:

How atoms/molecules arranged and bonds

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It would increase gravitational potential of water in the atmosphere.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

There would be no gravitational kinetic and an increase in gravitational potential.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would slow evaporation, decreased temperature wouldn't break bonds.

Part 2: Group Work

GROUP #: 3

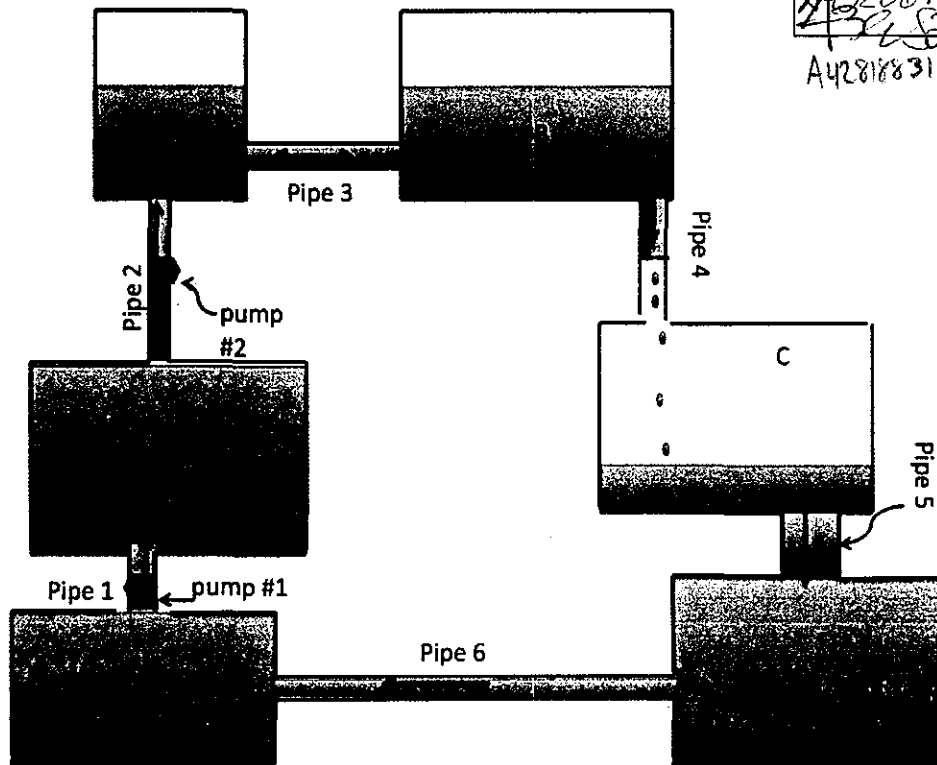
Student IDs of Members Present:

A42405167

A42005463

A43206773

A42818831



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	gravitational pot. → grav. kinetic	Pumping water into a lake/reservoir	gravitational potential → gravitational kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic → kinetic	Condensation	chemical pot. → thermal
Pipe 4	Grav. pot. → Grav. kinetic	Precipitation	grav. pot → grav. kinetic
Pipe 5	" "	Infiltration of surface water into ground	" "
Pipe 6	" "	Discharge of ground-water into streams	" "

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: energy in a non-moving object

Kinetic energy: energy of a moving object

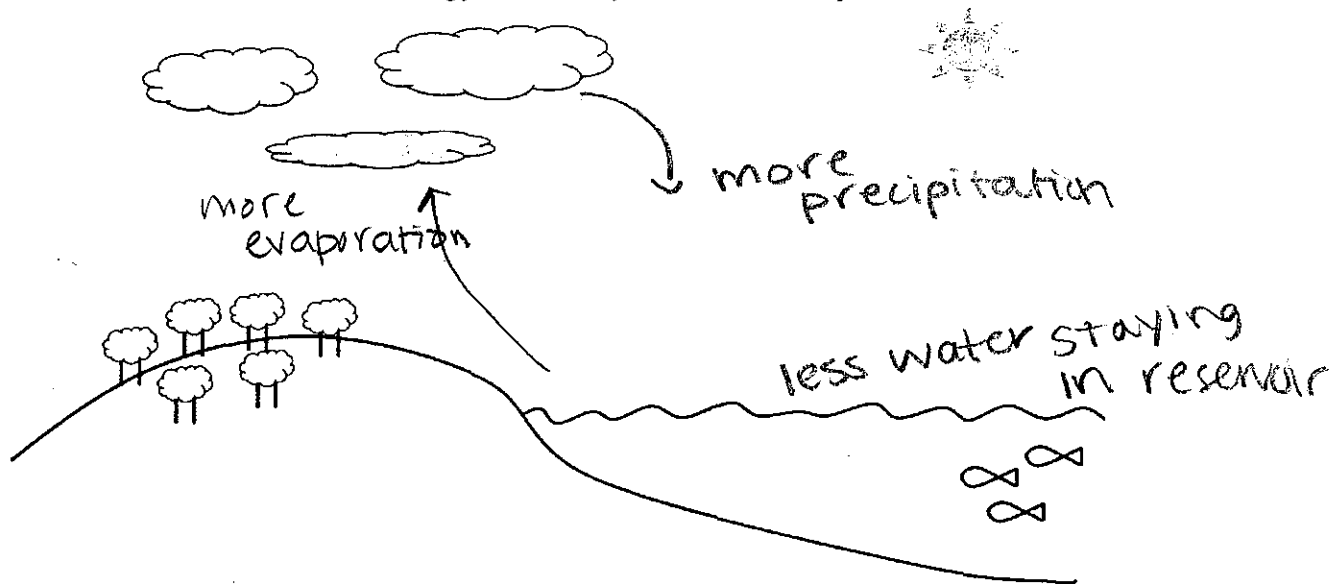
Gravitational energy: energy that draws objects to earth

Thermal energy: temperature

Chemical energy: energy when matter changes states

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There will be less precipitation

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

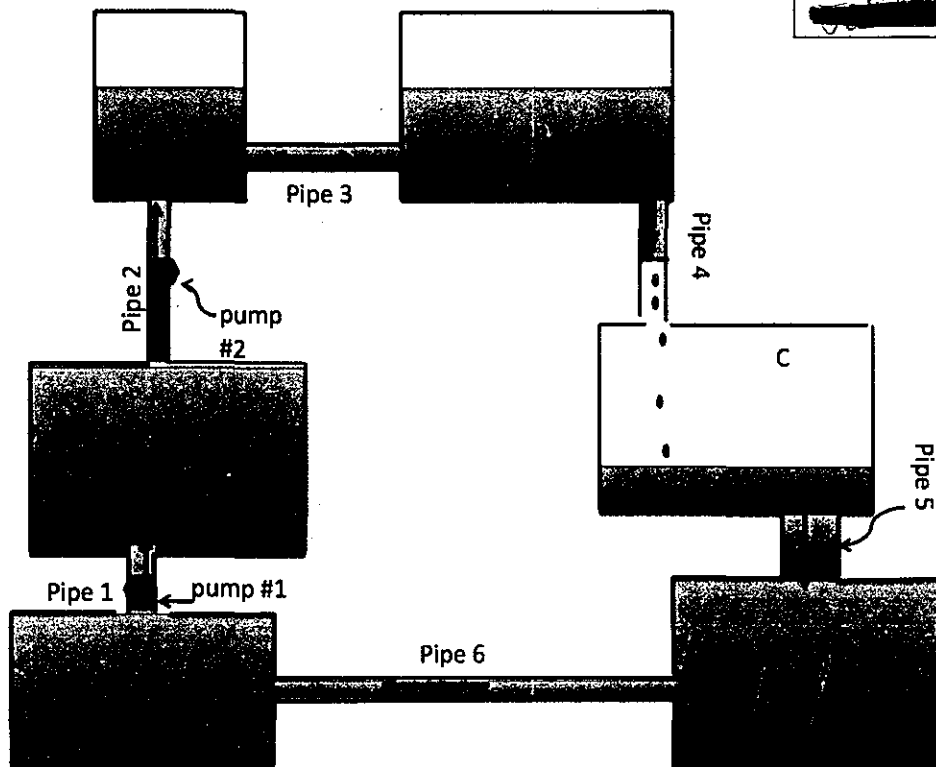
water would never change forms.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

There would be more kinetic energy in the cycle

Part 2: Group Work

GROUP #:
Student IDs of Members Present:
[redacted] 432910053
[redacted] A42288544
[redacted] A42460239



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic potential (electrons) Grav potential	Pumping water into a lake/reservoir	Gravitational potential Gravitational Kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Kinetic (electrons) Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) kinetic (water)	Condensation	Chemical potential + thermal kinetic
Pipe 4	Grav potential Grav potential	Precipitation	Grav potential Grav kinetic
Pipe 5	Grav potential Grav kinetic	Infiltration of surface water into ground	Grav potential Grav kinetic
Pipe 6	Grav potential Grav kinetic	Discharge of ground-water into streams	Grav potential Grav kinetic

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *Stored energy*

Kinetic energy: *Energy from movement*

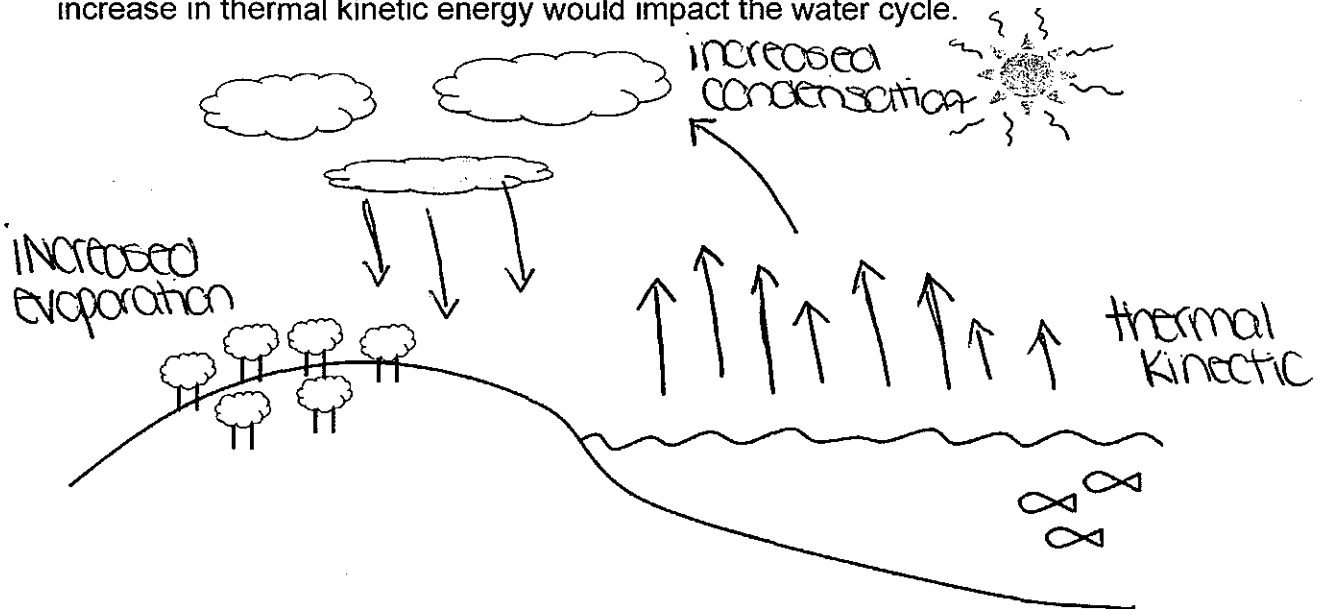
Gravitational energy: *Energy between two objects that attract.*

Thermal energy: *Energy produced by moving molecules.*

Chemical energy: *Energy produced when molecules arrange themselves.*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere.

Describe how this might affect the gravitational potential of water in the atmosphere.

A decrease in thermal energy would lead to a decrease in gravitational potential energy of water, decreasing condensation

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

There would be more potential energy because kinetic energy would be stopped

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would cause an increase in energy because the melting of the water breaks bonds which releases energy.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #:

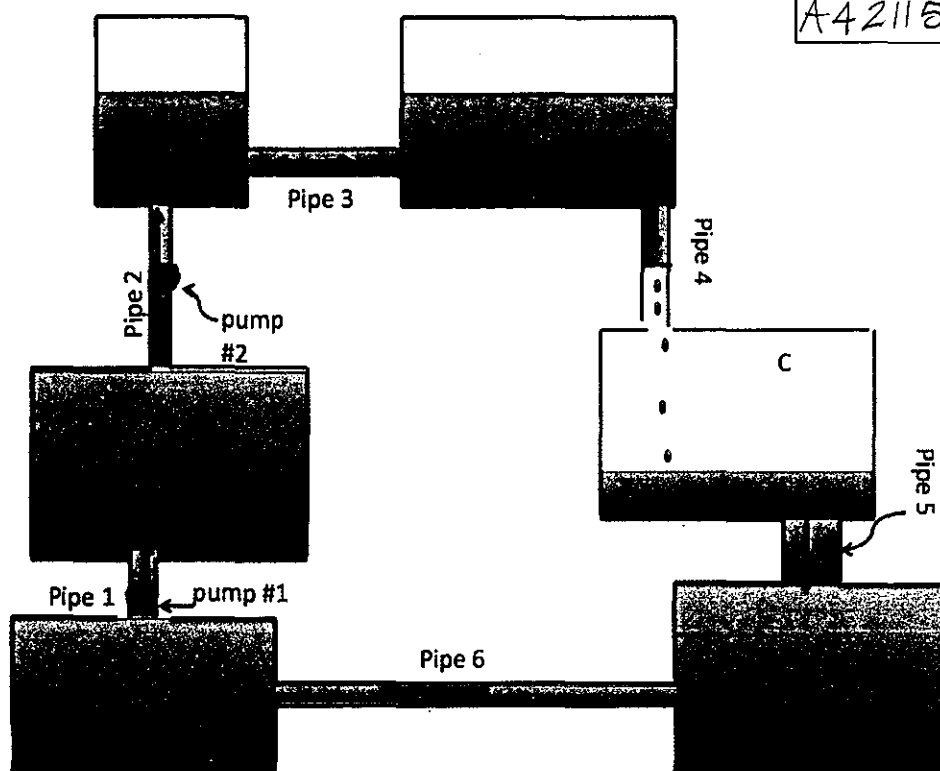
Student IDs of Members Present:

A40555917

A40004957

A40659482

A42115313



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	gravitational kinetic → gravitational potential	Pumping water into a lake/reservoir	Thermal (kinetic) → Thermal (potential)
Pipe/Pump 2	gravitational potential to gravitational kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic electrons → kinetic water	Condensation	Chemical potential → Thermal kinetic
Pipe 4	gravitational potential → gravitational kinetic	Precipitation	Thermal potential → Thermal kinetic
Pipe 5	gravitational kinetic → gravitational potential	Infiltration of surface water into ground	Thermal kinetic → Thermal potential
Pipe 6	gravitational potential → gravitational kinetic	Discharge of groundwater into streams	Thermal potential → Thermal kinetic

Kinetic electrons to grav. potential

potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: Something that causes energy if acted upon

Kinetic energy: Energy of movement that is being used

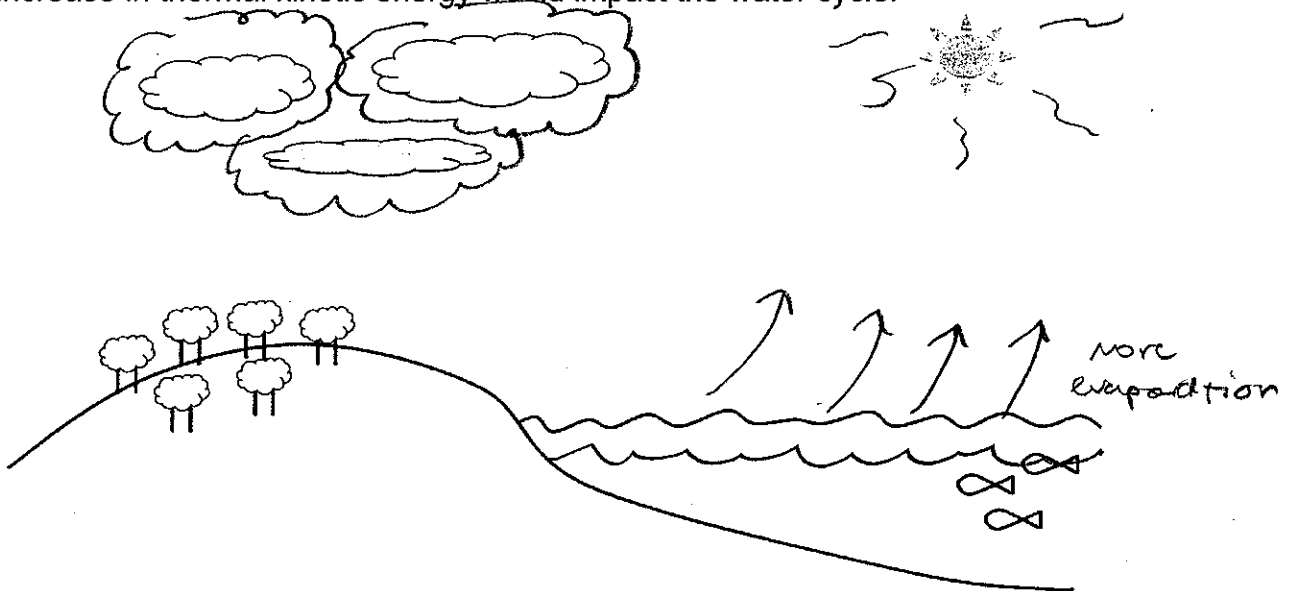
Gravitational energy: Energy that draws objects together

Thermal energy: Energy caused by movement of molecules within a body

Chemical energy: Energy caused by movement of atoms + molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It would snow

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

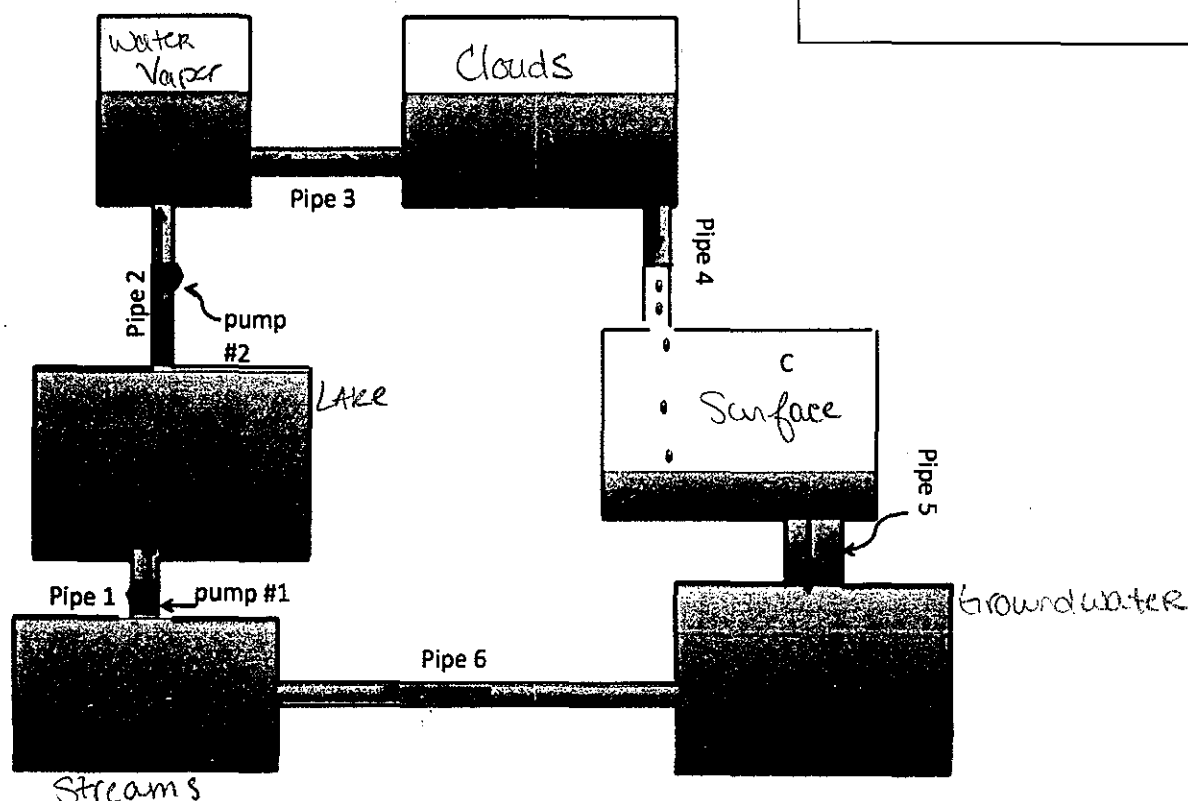
The water cycle would be disrupted, it would only precipitate until we ran out of water

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would slow down

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 6
Student IDs of Members Present:
A43763719 A42205094
A42600065 A39966164



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	grav potential → grav. kinetic	Pumping water into a lake/reservoir	grav potential → grav. kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic (electrons) → kinetic (water)	Condensation	chemical potential → thermal kinetic
Pipe 4	grav potential → grav. kinetic	Precipitation	grav potential → grav. kinetic
Pipe 5	grav potential → grav. kinetic	Infiltration of surface water into ground	grav potential → grav. kinetic
Pipe 6	grav potential → grav. kinetic	Discharge of ground-water into streams	grav potential → grav. kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy of movement

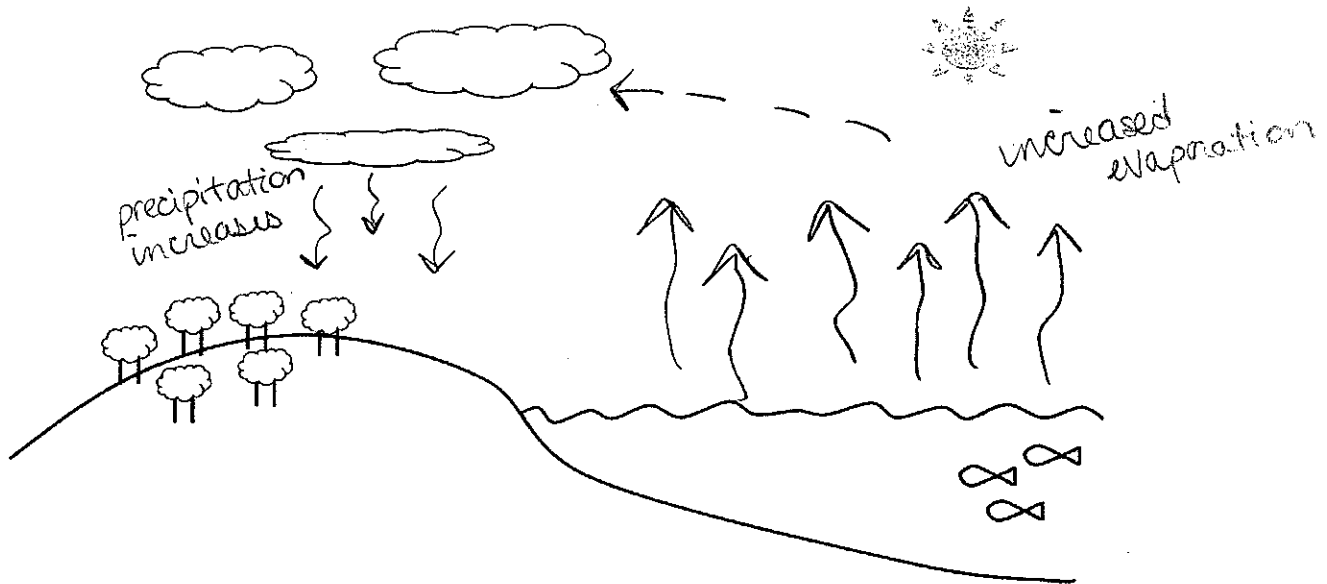
Gravitational energy: energy that pulls objects towards each other

Thermal energy: heat energy

Chemical energy: energy of molecules & atoms due to separation or bonding

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It would cause an increase in frozen precipitation & if the temp stays low, evaporation would dramatically decrease. That in turn would cause the grav. potential to decrease as well.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

If evaporation stopped, there would be a drought... meaning all energy would be potential energy.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

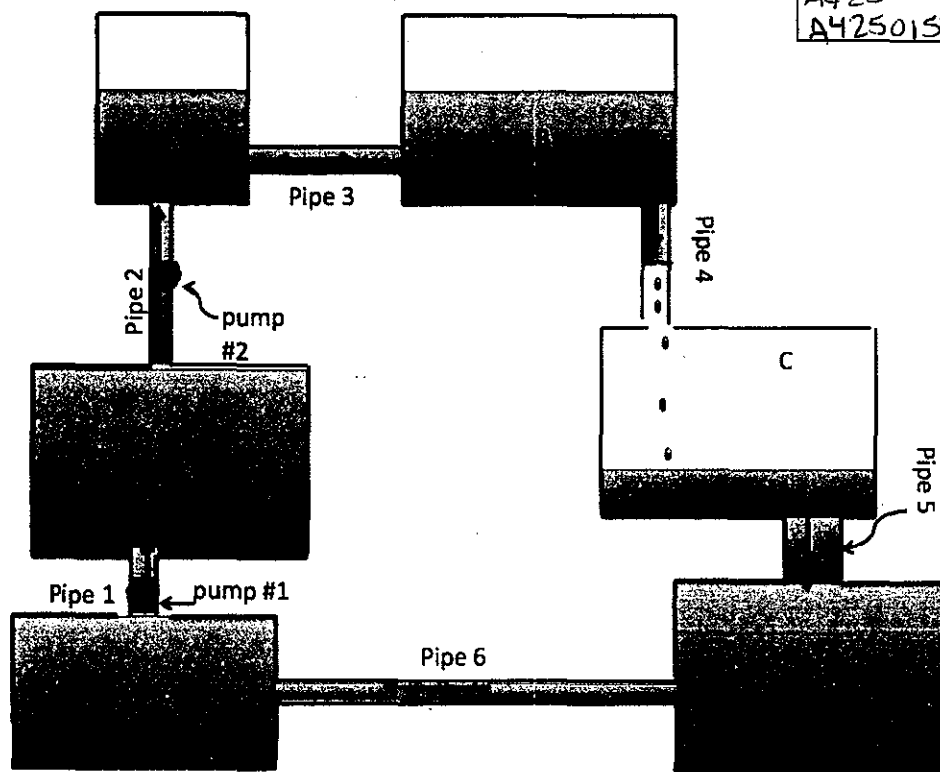
This energy would affect the water cycle because the temp ↓, meaning thermal energy ↓, so the total energy of the cycle would decrease as well.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 7

Student IDs of Members Present:

A42135792 - J [redacted]
A42100583 - S [redacted]
A42326587 - [redacted]
A42501575 - S [redacted]



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Grav. Kinetic → Grav. Potential	Pumping water into a lake/reservoir	Grav. Kinetic → Grav. Potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (evaporation) to Kinetic (water)	Condensation	Grav. Potential to Grav. Kinetic
Pipe 4	Grav. Potential → Grav. Kinetic	Precipitation	Grav. Potential to Grav. Kinetic
Pipe 5	Grav. Kinetic → Grav. Potential	Infiltration of surface water into ground	Grav. Kinetic → Grav. Potential
Pipe 6	Grav. Kinetic → Grav. Potential	Discharge of ground-water into streams	Grav. Kinetic → Grav. Potential

Kinetic to Grav. Potential

Potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: energy object has that can be used

Kinetic energy: energy object is using

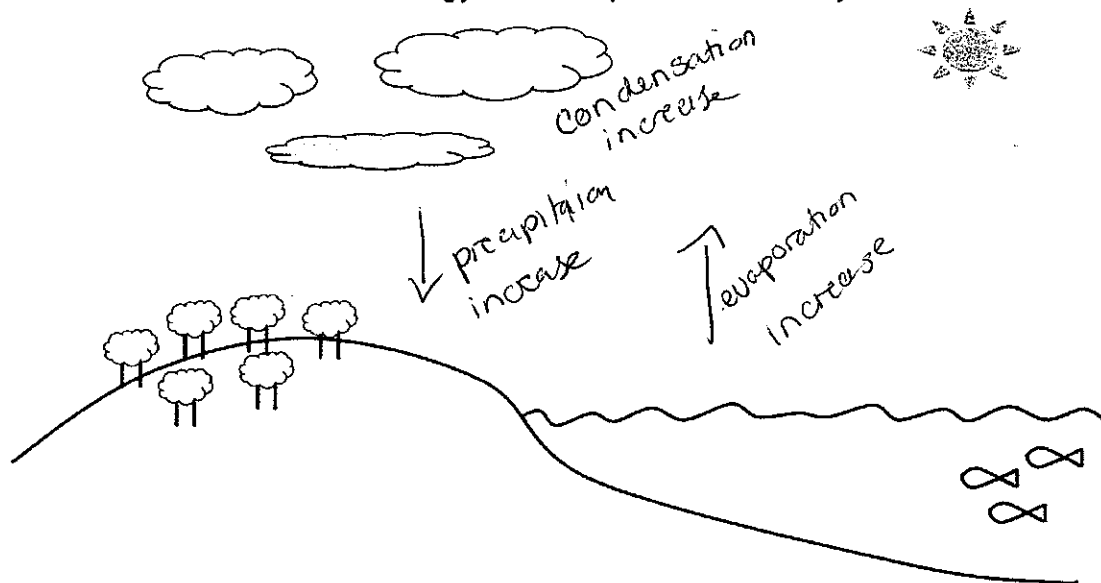
Gravitational energy: objects become pulled together

Thermal energy: movement of molecules within the object

Chemical energy: energy from formation of objects atoms & molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There's a decrease in thermal resulting in a decrease in gravitational because the process is slower

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

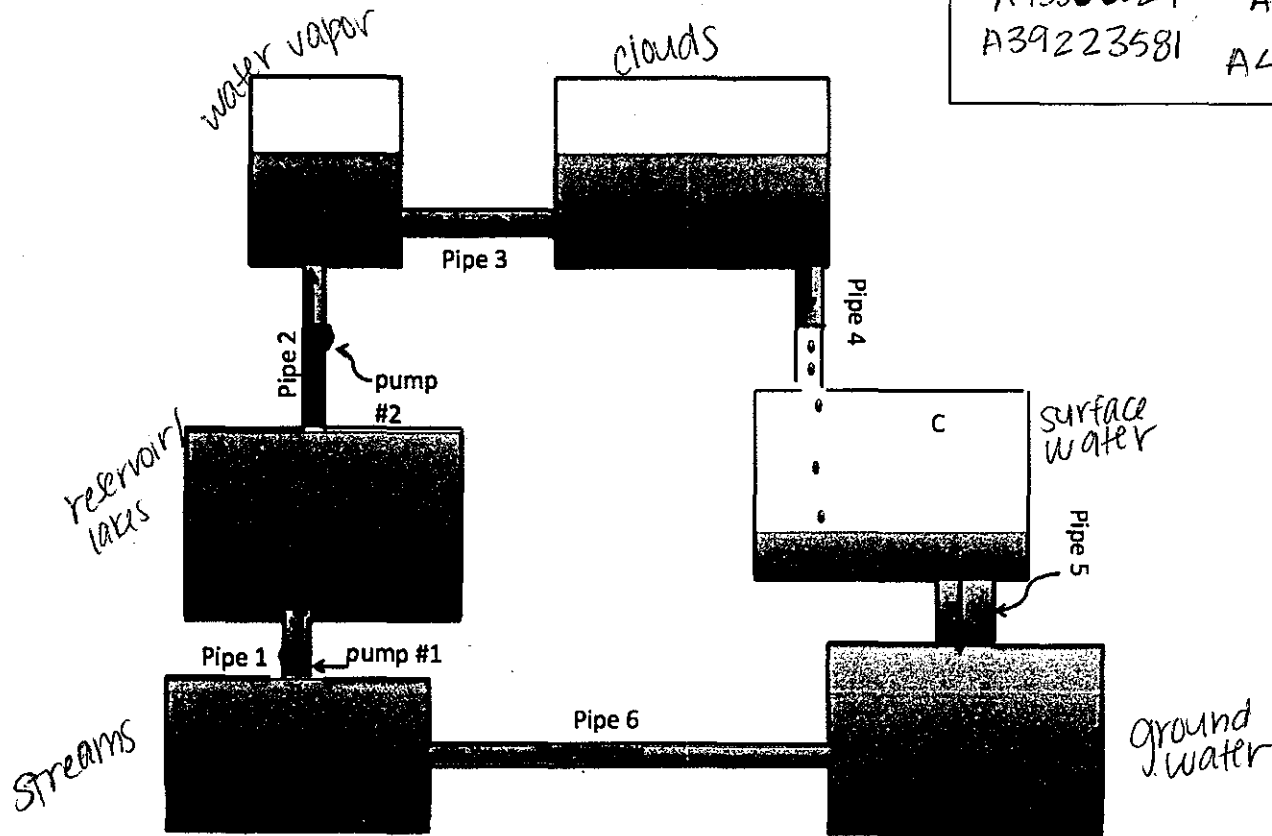
If you can't evaporate water anymore, there would be a break in the movement of water in the cycle.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

There would be a decrease in evaporation because of a decrease in thermal energy

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: #8
Student IDs of Members Present:
A43810027 A40833474
A39223581 A42311768



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	kinetic (electrons) grav. potential	Pumping water into a lake/reservoir	grav. potential → grav. kinetic.
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic electrons → kinetic water	Condensation	chemical potential → thermal kinetic
Pipe 4	grav. potential → grav. kinetic	Precipitation	grav. potential → grav. kinetic
Pipe 5	grav. potential → grav. kinetic.	Infiltration of surface water into ground	" "
Pipe 6	grav. potential → grav. kinetic	Discharge of ground-water into streams	" "

grav. potential →
grav. kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *stored energy*

Kinetic energy: *energy of movement.*

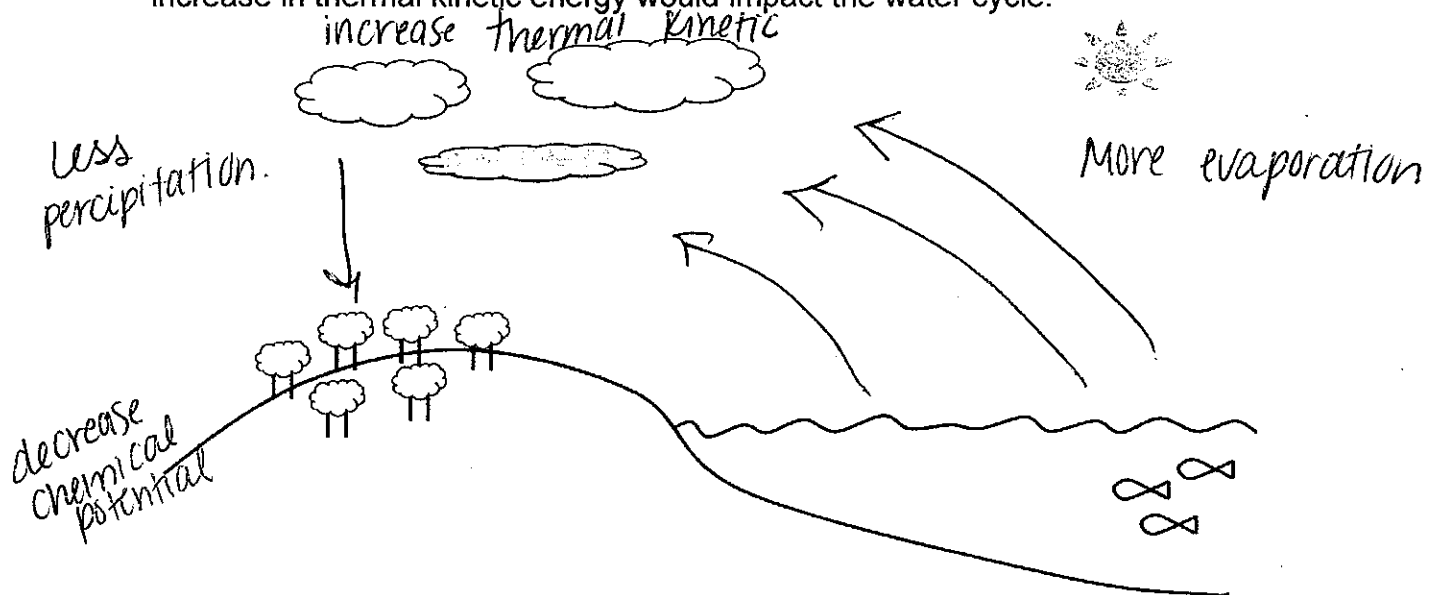
Gravitational energy: *energy that causes attraction of objects.*

Thermal energy: *Heat. - movement of molecules*

Chemical energy: ~~the~~ *because of the arrangements of atoms and molecules.*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

The decrease would cause less evaporation, less water in the atmosphere so a decrease in gravitational potential of water;

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

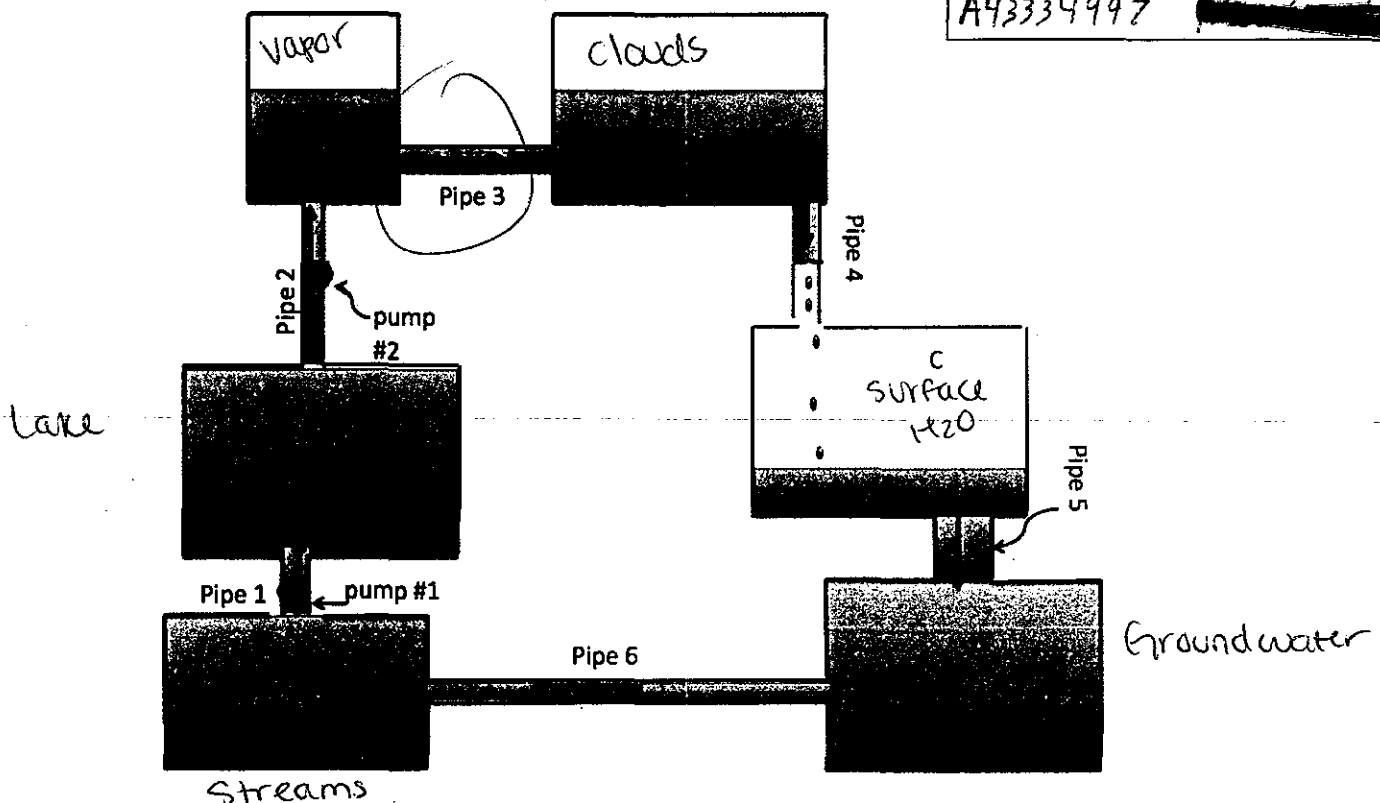
There would only be gravitational energy in the cycle then

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

energy would ~~the~~ increase because of the latent heat when the bonds are changing and forming new ones. (like the experiment shown)

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 9
Student IDs of Members Present:
A41650757-
A40680269
A43334997



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic \rightarrow grav. potential	Pumping water into a lake/reservoir	kinetic \rightarrow grav. potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	grav. potential \rightarrow grav. kinetic	Condensation	Chem. potential \rightarrow thermal grav. kinetic
Pipe 4	grav. potential \rightarrow grav. kinetic	Precipitation	grav. potential \rightarrow grav. kinetic
Pipe 5	Grav. potential \rightarrow Grav. kinetic	Infiltration of surface water into ground	Grav. potential \rightarrow Grav. kinetic
Pipe 6	Grav. potential \rightarrow Grav. kinetic	Discharge of ground-water into streams	Grav. potential \rightarrow Grav. kinetic

Kinetic (electrons) \rightarrow Grav. potential
Pipe 3 Energy converted
Kinetic (electrons) \rightarrow kinetic (water)

Thermal kinetic
 \rightarrow Chem. potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: energy stored

Kinetic energy: movement

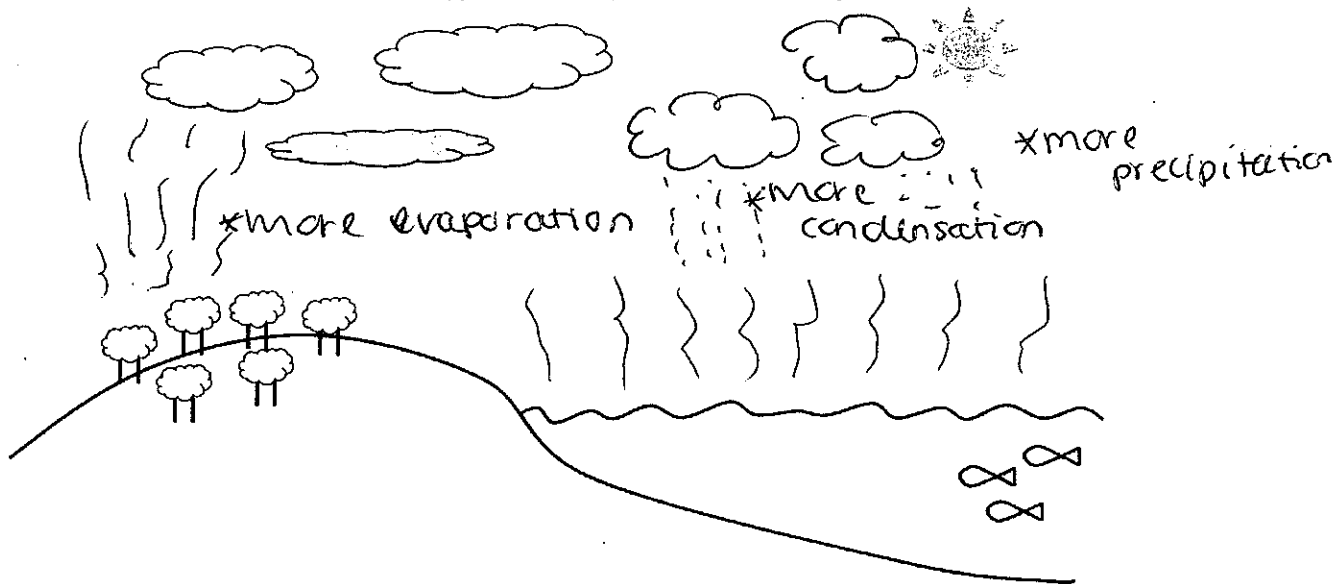
Gravitational energy: movement together

Thermal energy: heat - energy from

Chemical energy: arrangement of atoms + molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It would decrease the gravitational potential of water in the atmosphere because less water is condensing.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

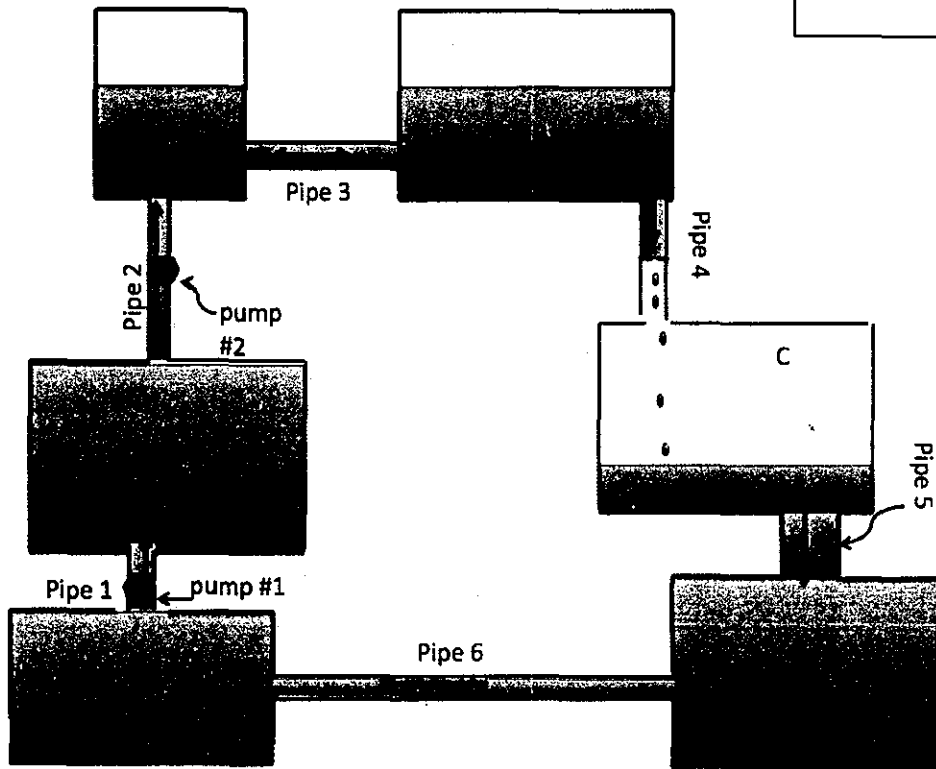
No more water in the atmosphere - It would all stay on the ground.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

less evaporation because slow down the rate of evaporation (molecules in the water)

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 10
Student IDs of Members Present:
A42108428
A39916396



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1		Pumping water into a lake/reservoir	Gravitational
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) → Kinetic (water)	Condensation	Chemical (potential) → Thermal (kinetic) → Gravitational Potential
Pipe 4	Gravitational Potential → Gravitational Kinetic	Precipitation	Gravitational Potential → Gravitational Kinetic
Pipe 5	Gravitational Kinetic → Gravitational Potential	Infiltration of surface water into ground	Gravitational Kinetic → Gravitational Potential
Pipe 6	Gravitational Potential to Gravitational Kinetic	Discharge of ground-water into streams	Gravitational potential to gravitational kinetic

Kinetic
to
Gravitational

Gravitational
Potential

Part 2: Group Work

Group Questions: ~~USE A SEPARATE SHEET AS NEEDED~~

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *energy stored up for later use.*

Kinetic energy: *energy of movement*

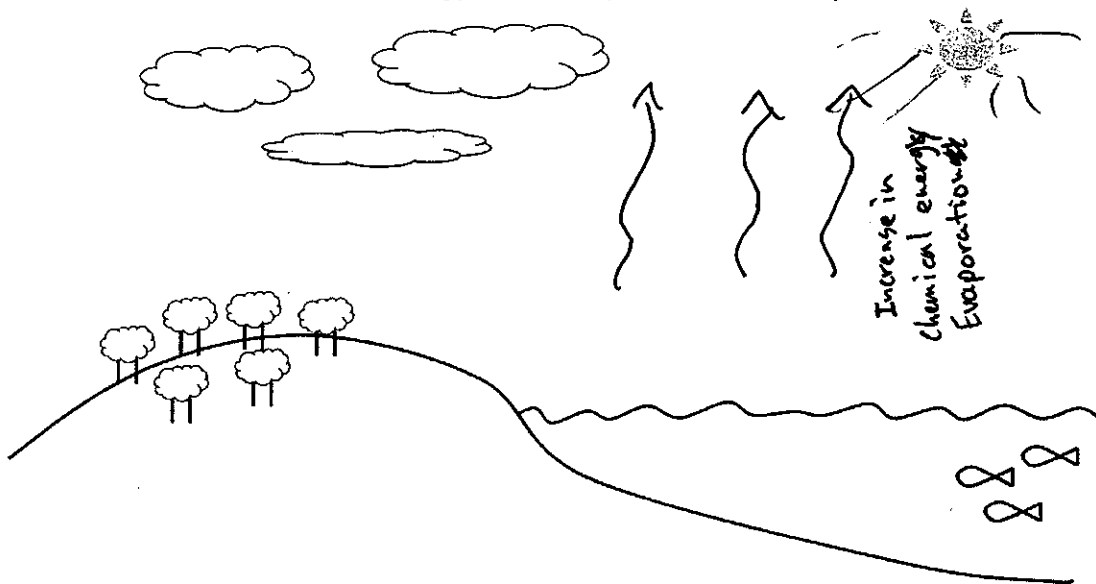
Gravitational energy: *energy / movement driven by the forces coming together.*

Thermal energy: *energy created and driven by the movement of atoms (heat source)*

Chemical energy: *energy created from chemical changes*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It would impact it in the sense that the potential energy would not exist.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

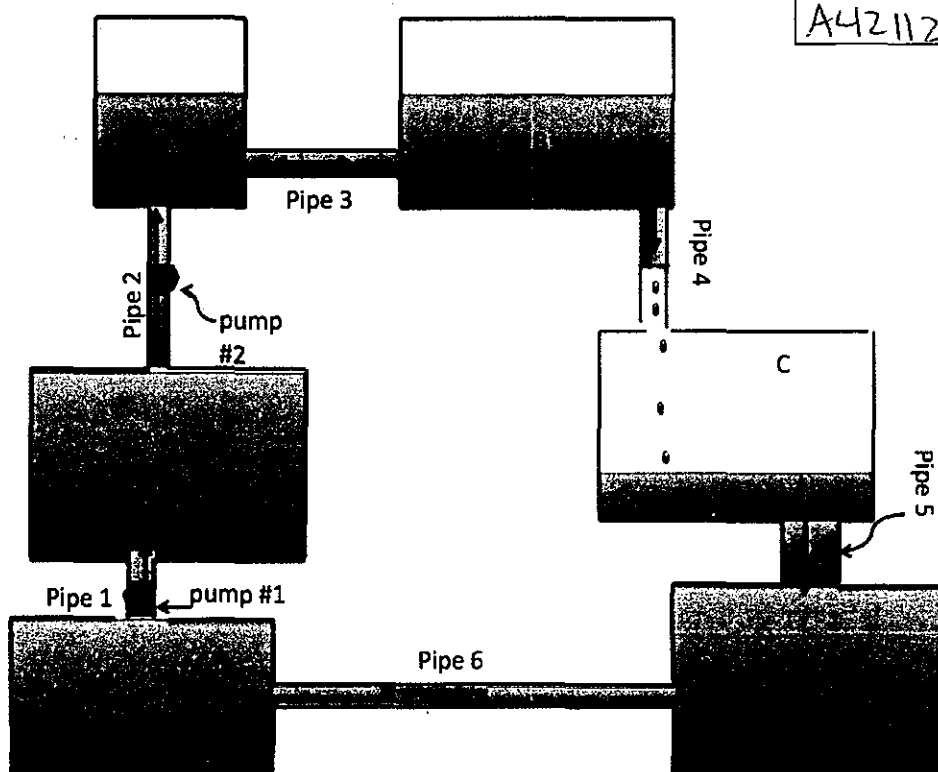
Chemical (kinetic)
Energy in the water cycle would decrease because the thermal kinetic energy that ~~is~~ creates gravitational potential energy in evaporation, leading to a decrease in energy to be used later to break chemical bonds.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to liquid water melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would decrease the amount of energy in the water cycle, because more thermal energy would be required for kinetic changes.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 11
Student IDs of Members Present:
A 43835916
A42154647
A42112058



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Grav. (potential) → Grav. (Kinetic)	Pumping water into a lake/reservoir	Grav. potential → Grav. Kinetic
Pipe/Pump 2	Kinetic (electrons) Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) Kinetic (water)	Condensation	Chemical (potential) → Thermal (kinetic)
Pipe 4	Grav. (potential) → Grav. (Kinetic)	Precipitation	Grav. (potential) → Grav. (Kinetic)
Pipe 5	Grav. (potential) → Grav. (Kinetic)	Infiltration of surface water into ground	Grav. (potential) → Grav. (Kinetic)
Pipe 6	Grav. (potential) → Grav. (Kinetic)	Discharge of ground-water into streams	Grav. (potential) → Grav. (Kinetic)

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy:

Kinetic energy:

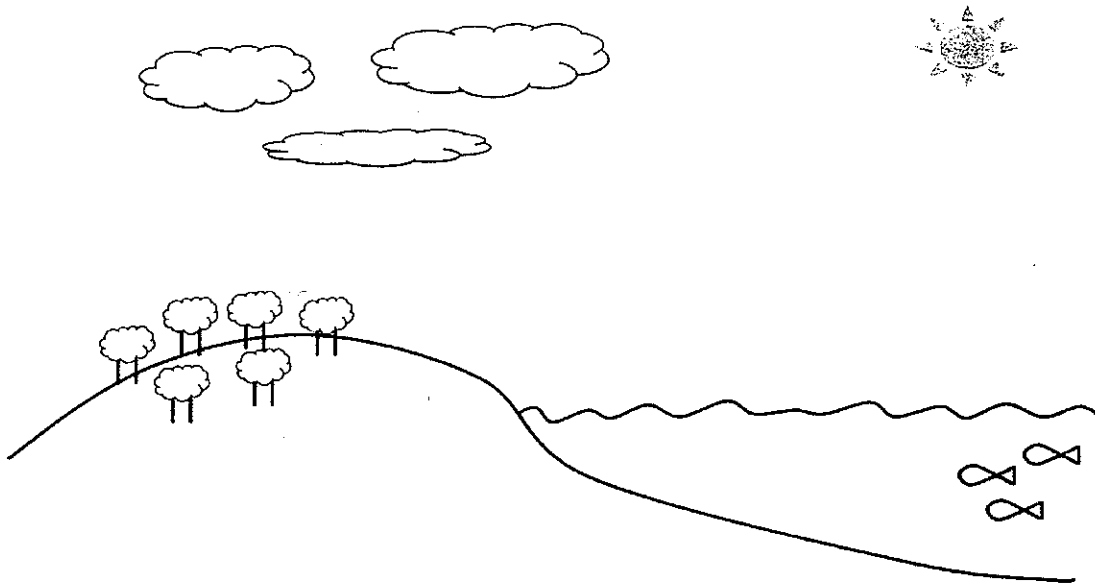
Gravitational energy:

Thermal energy:

Chemical energy:

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Part 2: Group Work

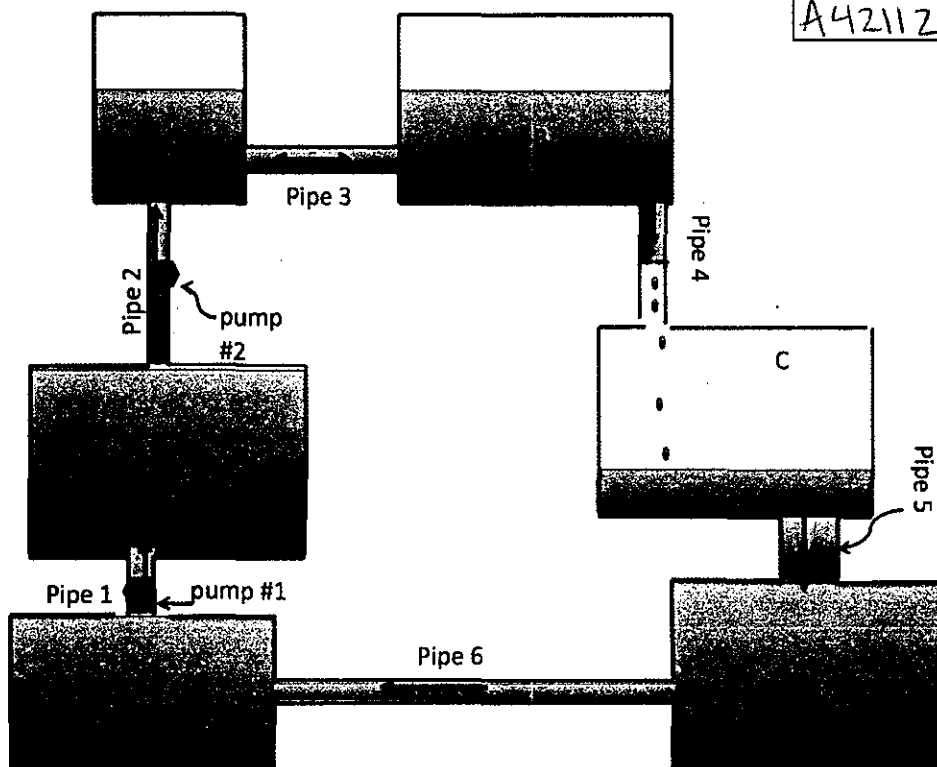
GROUP #: 11

Student IDs of Members Present:

A43835916

A42154647

A42112058



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1		Pumping water into a lake/reservoir	
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic <i>Kinetic (electrons)</i>	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy <i>Potential</i>
Pipe 3		Condensation	
Pipe 4		Precipitation	
Pipe 5		Infiltration of surface water into ground	
Pipe 6		Discharge of ground-water into streams	

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: movements

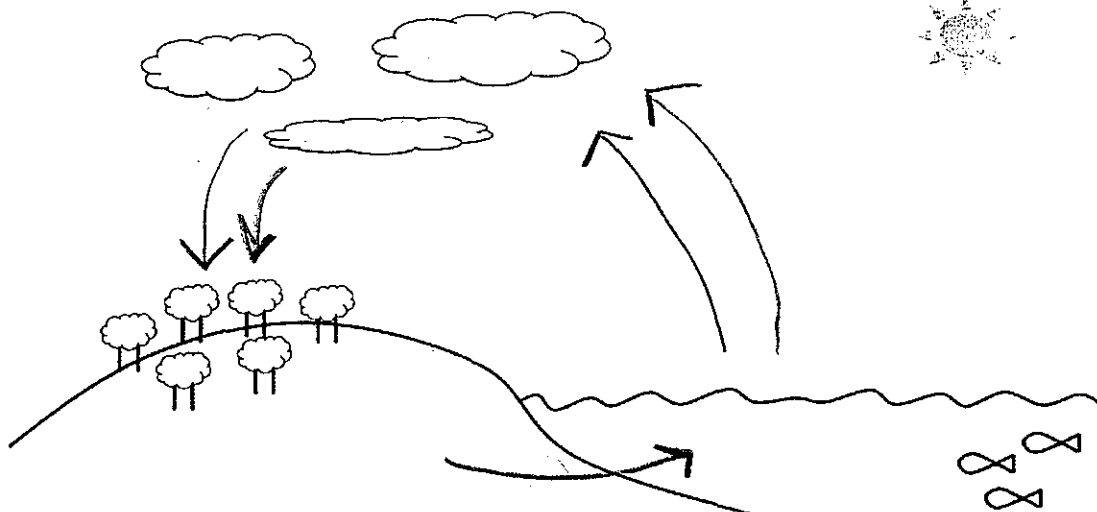
Gravitational energy: being pulled toward earth

Thermal energy: movement of molecules

Chemical energy: comes from formation of molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



The water molecules will change ~~states of~~ matter quicker because the temp. increased

C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

The water molecules would move slower and cause an increase in grav. potential energy.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

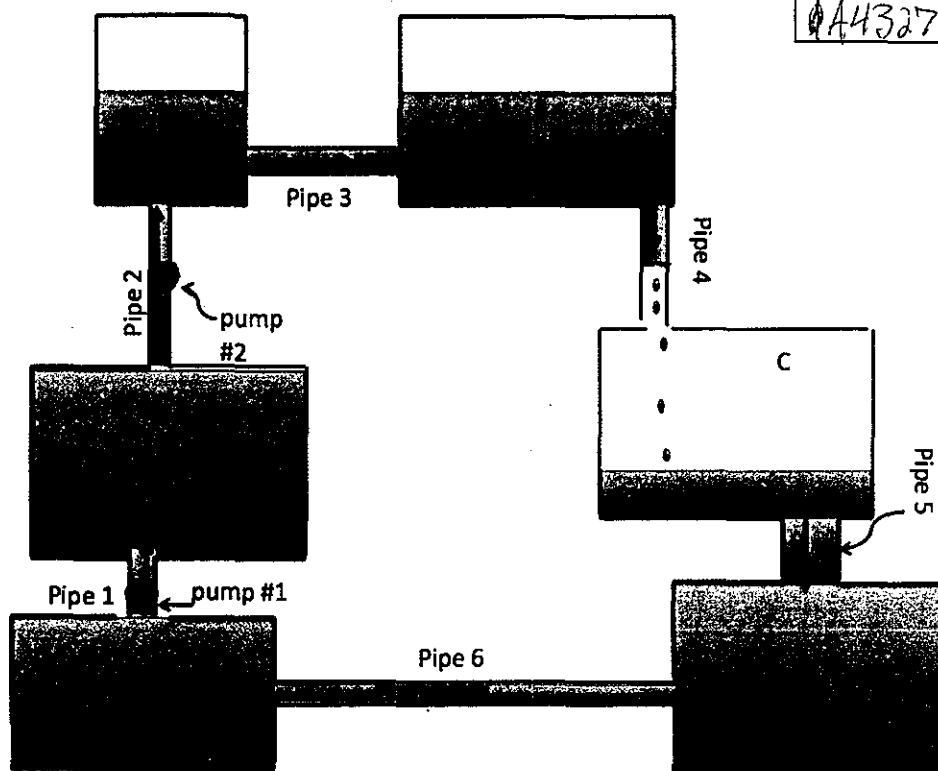
The amount of grav. potential energy would greatly increase while the amount of grav. kinetic would decrease.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

The amount of thermal energy would decrease.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 12
Student IDs of Members Present:
A40920866
A43506836 A43365634
A43272425



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic (electrons) → gravitational potential	Pumping water into a lake/reservoir	Gravitational potential → gravitational kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy Potential
Pipe 3	Kinetic (electrons) → Kinetic (water)	Condensation	Chemical potential → Thermal kinetic
Pipe 4	Gravitational potential → gravitational kinetic	Precipitation	Gravitational potential → gravitational kinetic
Pipe 5	gravitational potential → gravitational kinetic	Infiltration of surface water into ground	Gravitational potential → gravitational kinetic
Pipe 6	Gravitational potential → gravitational kinetic	Discharge of ground-water into streams	Gravitational potential → gravitational kinetic

Kin. elect. & Gravit. Pot.

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy in motion

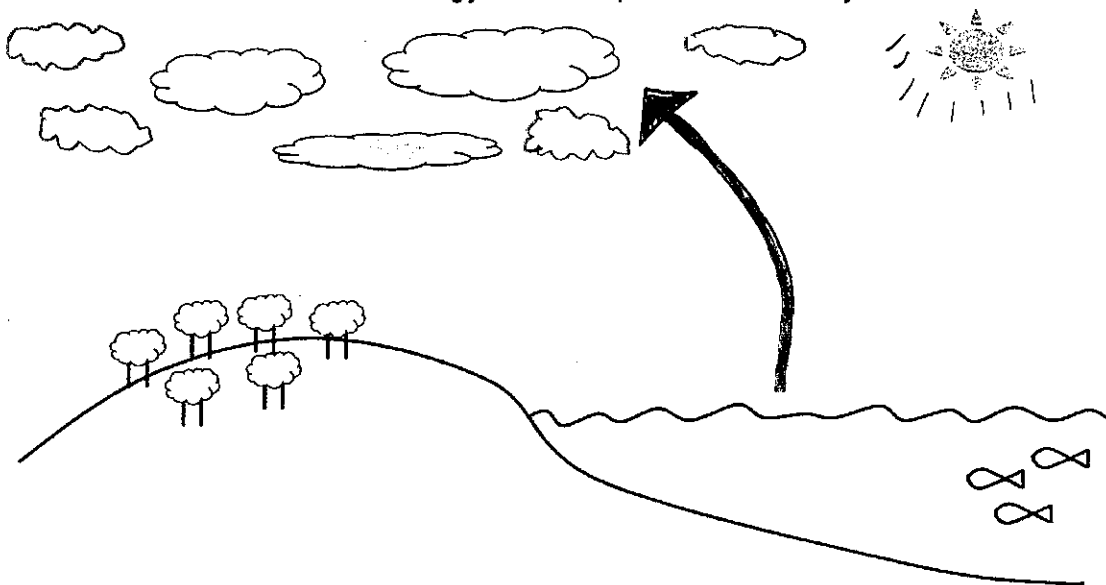
Gravitational energy: energy that brings things together

Thermal energy: energy that's determined by how fast molecules are moving

Chemical energy: energy determined by the composition of atoms/molecules in a substance

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There would be less gravitational potential of water in the atmosphere since not as much water could evaporate due to the lack of thermal energy.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Overall potential energy would be increased since energy would be stored in reservoirs.

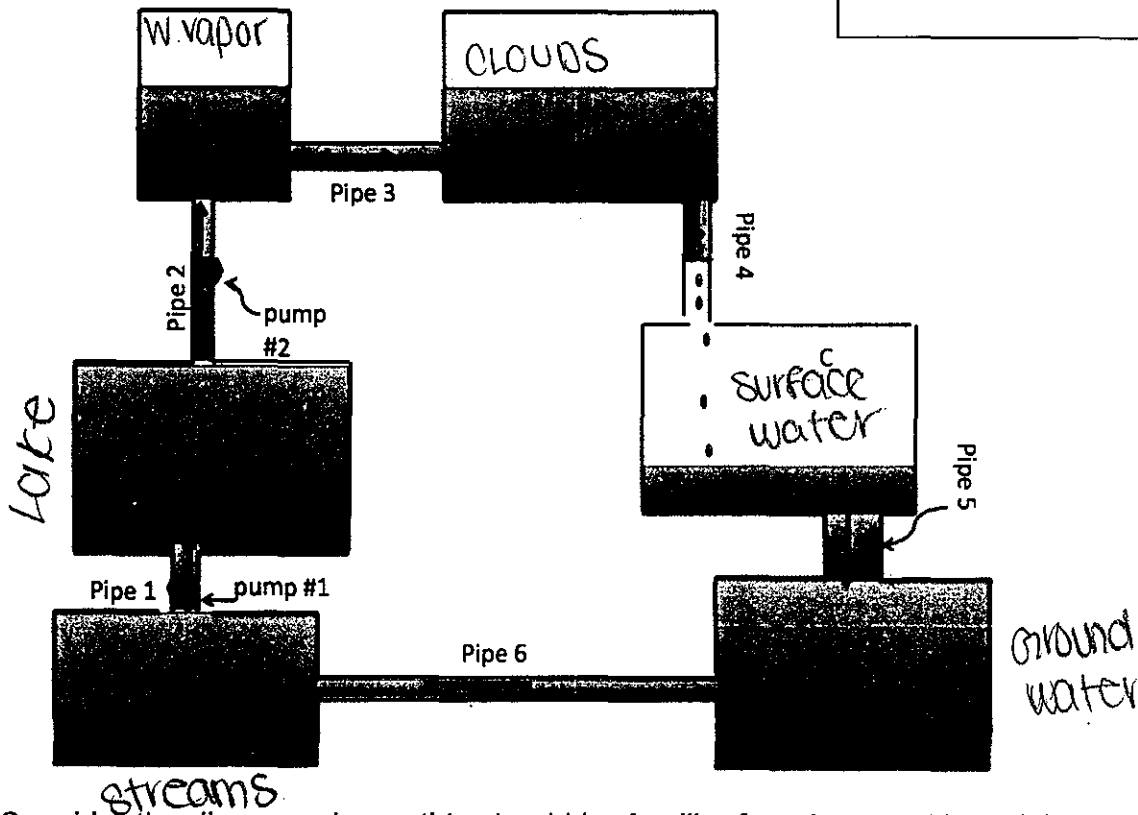
E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Kinetic energy would decrease which would in turn decrease the utilization of potential energy.

GROUP #: 13

Student IDs of Members Present:

A42957208, A42096029, A43819247
 A42123279, A42097647



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	grav. pot. grav. kin.	Pumping water into a lake/reservoir	grav. pot. grav. kin
Pipe/Pump 2	Gravitational Potential to Gravitational kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy potential
Pipe 3	kin(electrons) kin(water)	Condensation	chem. pot. thermal kin
Pipe 4	grav. pot. grav. kin	Precipitation	grav. pot. grav. kin
Pipe 5	grav. pot. grav. kin.	Infiltration of surface water into ground	grav. pot. grav. kin.
Pipe 6	grav. pot. grav. kin	Discharge of ground-water into streams	grav. pot. grav. kin

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: all the energy stored because of its position

Kinetic energy: energy created in a body because of movement

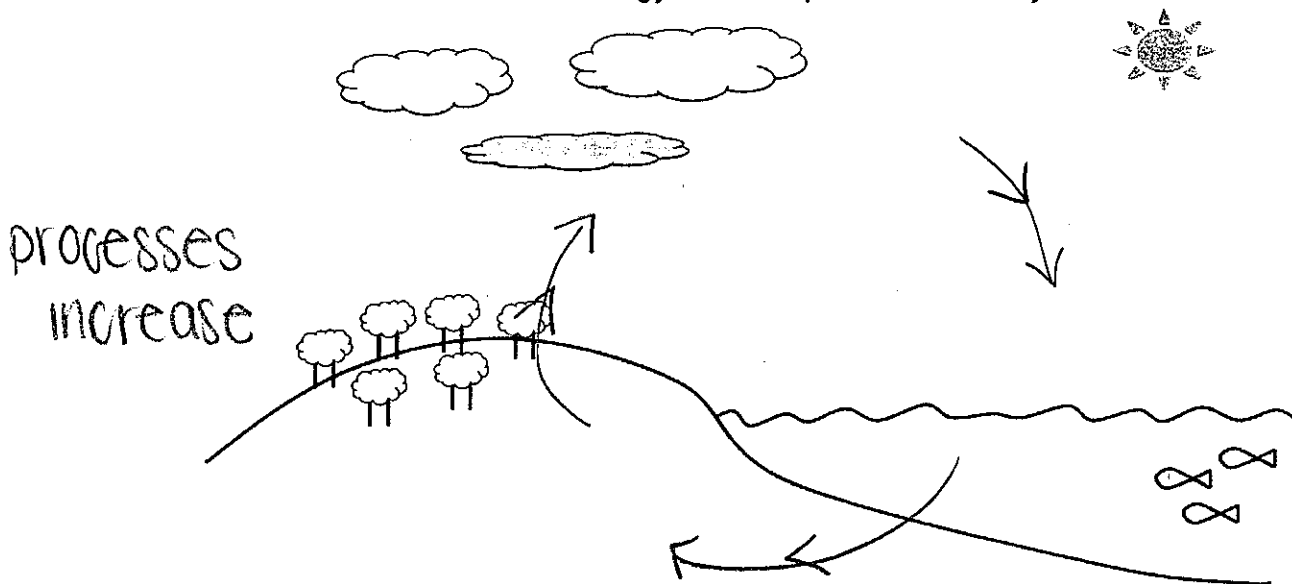
Gravitational energy: attraction between objects that bring them together

Thermal energy: movement of molecules that create energy w/in a body

Chemical energy: the order of atoms and molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

the gravitational potential & kinetic energy would decrease.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Thermal potential energy will increase

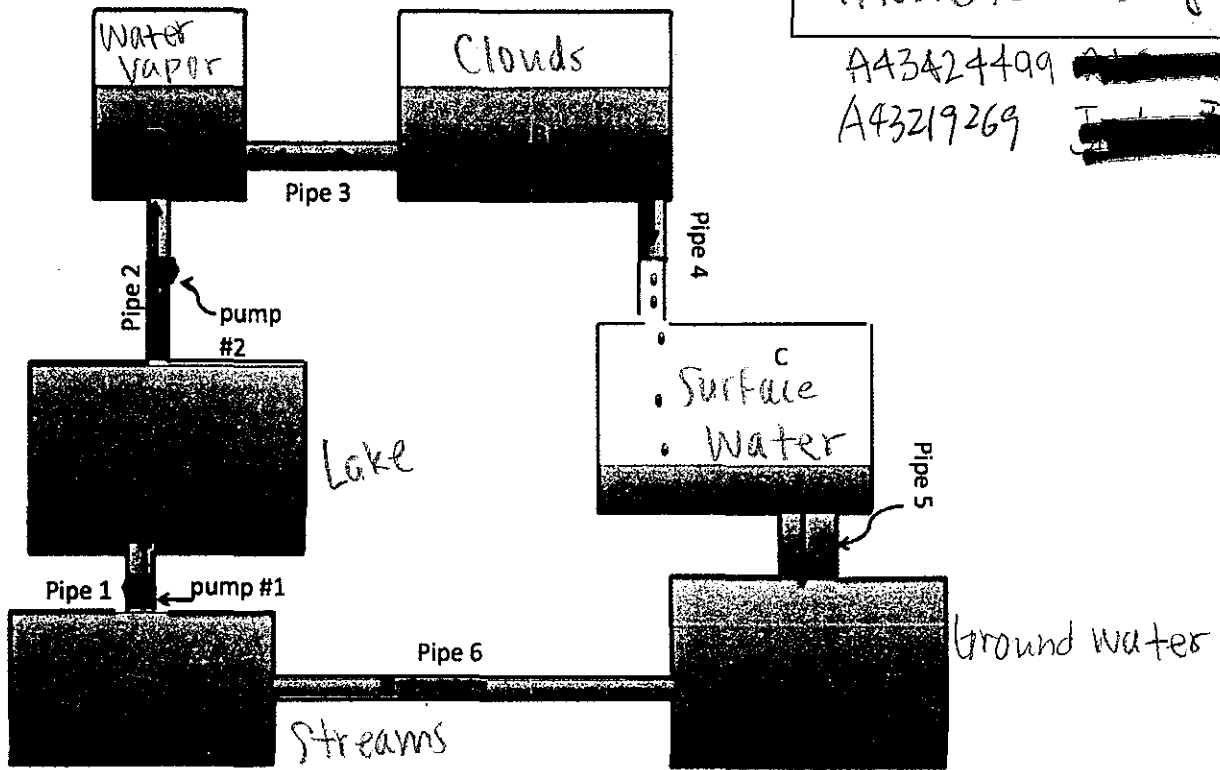
E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Thermal kinetic energy would decrease

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 14
Student IDs of Members Present:
A39222014
A4337676

A43424499
A43219269



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	kinetic (electrons) → kinetic (water)	Pumping water into a lake/reservoir	kinetic (electrons) → kinetic (water)
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic (electrons) → kinetic (water)	Condensation	Chemical potential → thermal kinetic
Pipe 4	gravitational potential → gravitational kinetic	Precipitation	gravitational potential → gravitational kinetic
Pipe 5	gravitational potential → gravitational kinetic	Infiltration of surface water into ground	gravitational potential → gravitational kinetic
Pipe 6	gravitational potential → gravitational kinetic	Discharge of ground-water into streams	gravitational potential → gravitational kinetic

kinetic →
grav pot

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy of movement

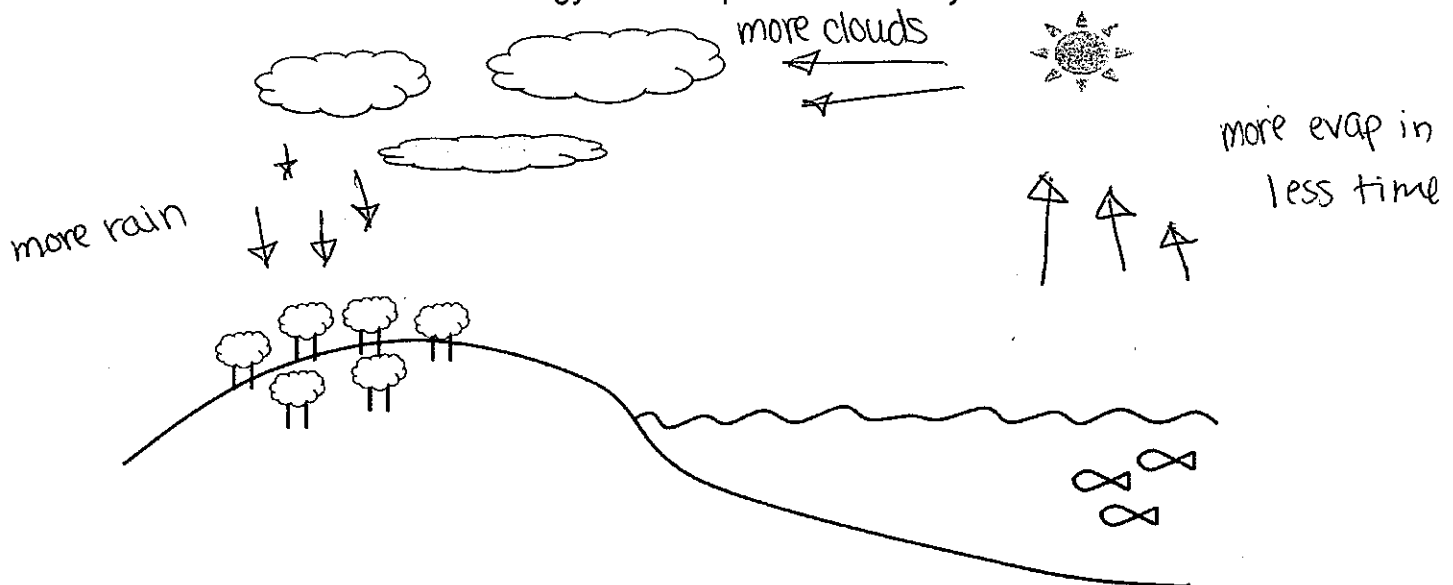
Gravitational energy: objects being attracted to one another

Thermal energy: heat + molecule movement

Chemical energy: bonds forming/breaking

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

less rain/snow because evaporation would take more time

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Much less clouds + precipitation

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

less evaporation because water is more dense.

Part 2: Group Work

15

~~XXXXXXXXXX~~ A42669701
~~XXXXXXXXXX~~ A41102196
~~XXXXXXXXXX~~ A40945005
~~XXXXXXXXXX~~

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *stored energy*

Kinetic energy: *energy of movement*

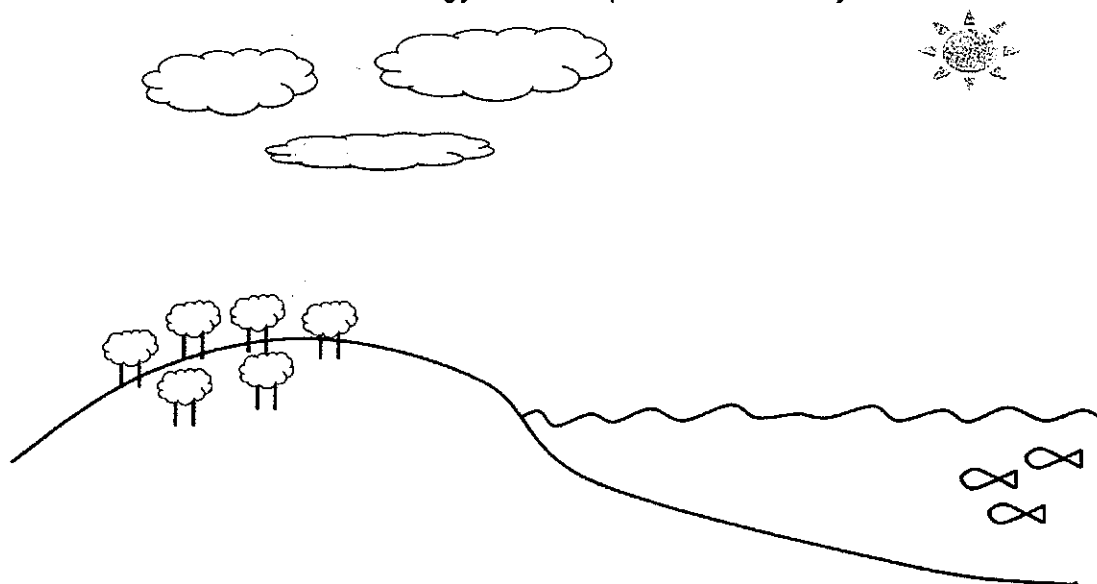
Gravitational energy: *the energy that draws objects together*

Thermal energy: *heat energy*

Chemical energy: *energy stored in molecular bonds*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

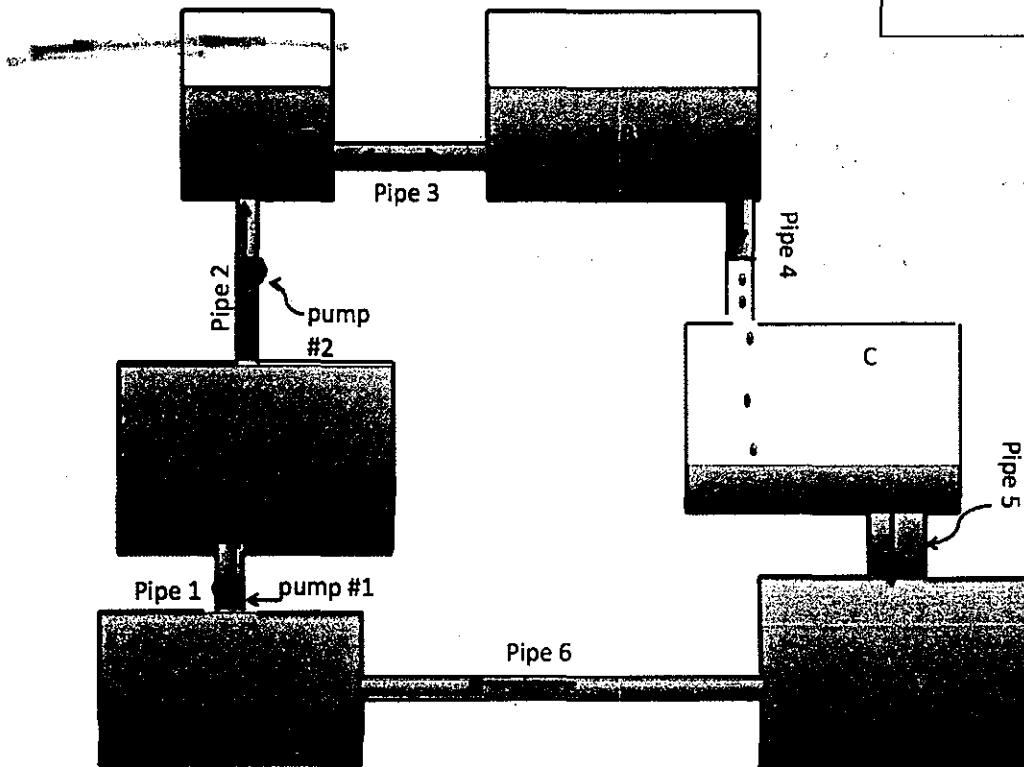
B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	kinetic (electrons) → gravitational potential	Pumping water into a lake/reservoir	gravitational kinetic → gravitational potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy potential
Pipe 3	grav	Condensation	Chemical potential → thermal kinetic
Pipe 4		Precipitation	
Pipe 5		Infiltration of surface water into ground	
Pipe 6		Discharge of groundwater into streams	

ISP203A – Global Change, Energy
Part 2: Group Work

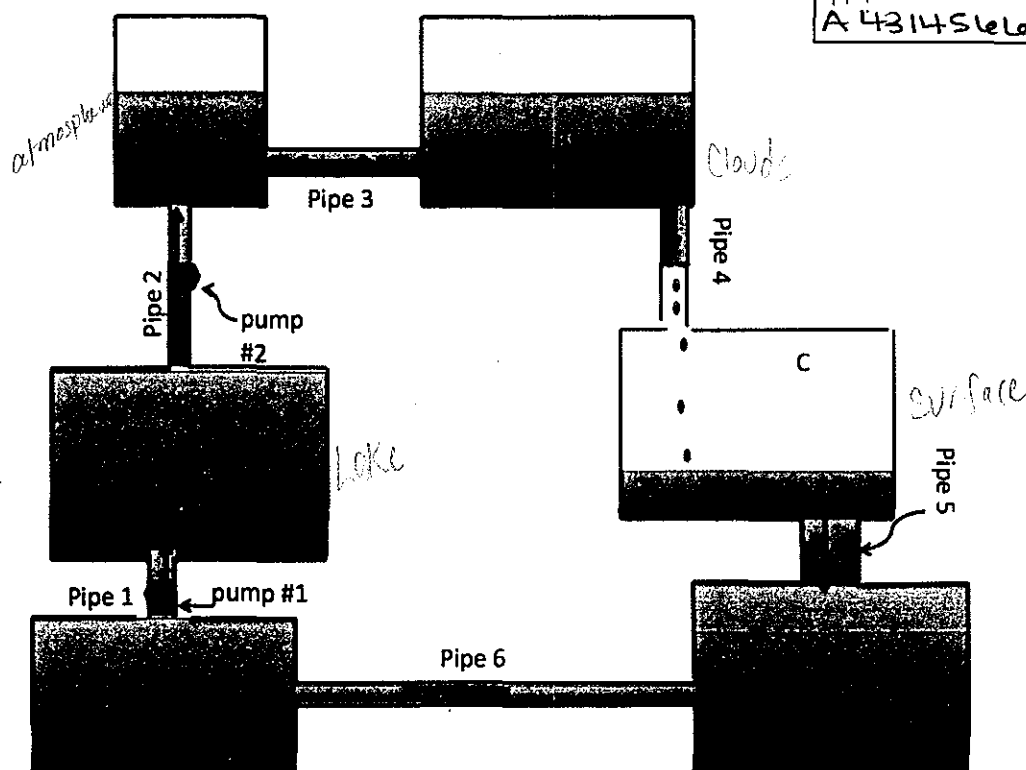
GROUP #: 16

Student IDs of Members Present:

A37497903 A41944159

A40974799

A43145662



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	grav. potential → grav. kinetic	Pumping water into a lake/reservoir	grav. potential → grav. kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic (electrons) → kinetic (water)	Condensation	chemical potential → thermal kinetic
Pipe 4	grav. potential → grav. kinetic	Precipitation	grav. potential → gravitational kinetic
Pipe 5	grav. potential → grav. kinetic	Infiltration of surface water into ground	grav. potential → grav. kinetic
Pipe 6	grav. potential → grav. kinetic	Discharge of ground-water into streams	grav. potential → grav. kinetic

Kinetic (electrons)

potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: movement or change

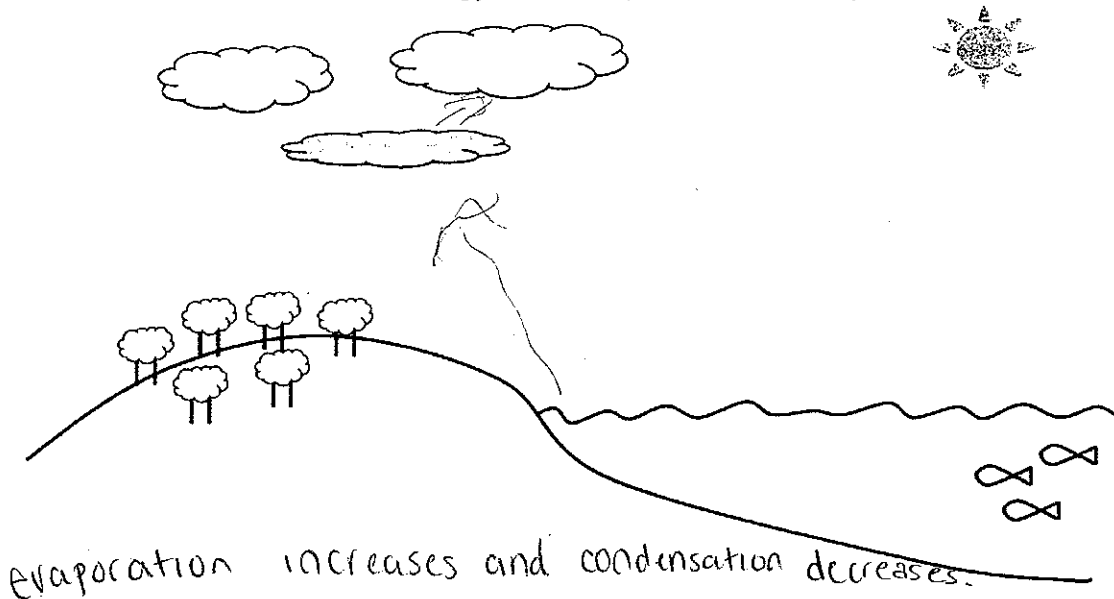
Gravitational energy: draws objects together

Thermal energy: heat energy

Chemical energy: the energy released by breaking bonds.

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

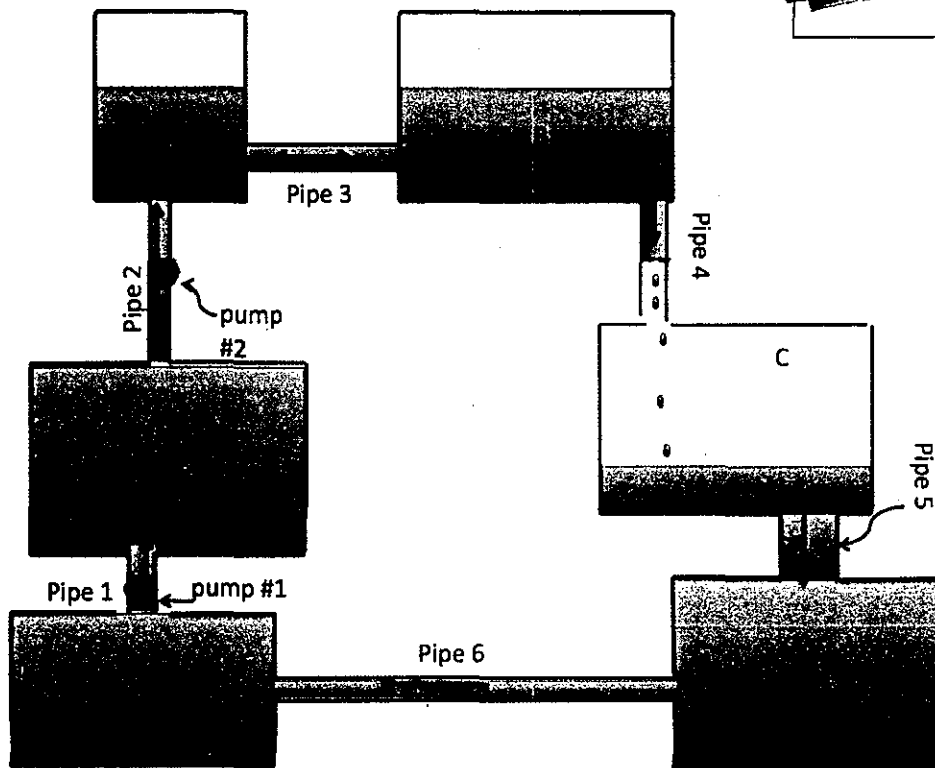
Decrease the gravitational potential of water in the atmosphere because there would be less precipitation.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Stops energy because all cycle will stop

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

evaporation decreases
condensation decreases



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Grav. kinetic \rightarrow Grav. Potential	Pumping water into a lake/reservoir	Grav Kinetic \rightarrow Grav Potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic to kinetic electrons water	Condensation	Chemical (potential) \rightarrow Thermal (kinetic)
Pipe 4	Grav. Potential \rightarrow Grav. kinetic	Precipitation	Grav. potential \rightarrow Grav. kinetic
Pipe 5	Grav kinetic - Grav Potential	Infiltration of surface water into ground	Grav Kinetic - Grav Potential
Pipe 6	Grav. Potential \rightarrow Grav. kinetic	Discharge of ground-water into streams	Grav. potential \rightarrow Grav. kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: The energy produced by an object's build

Kinetic energy: The energy caused by movement.

Gravitational energy: The energy that pulls objects together

Thermal energy: The energy related to heat. The rate at which molecules are moving in the object

Chemical energy: The energy of the atoms and molecules in a bond

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

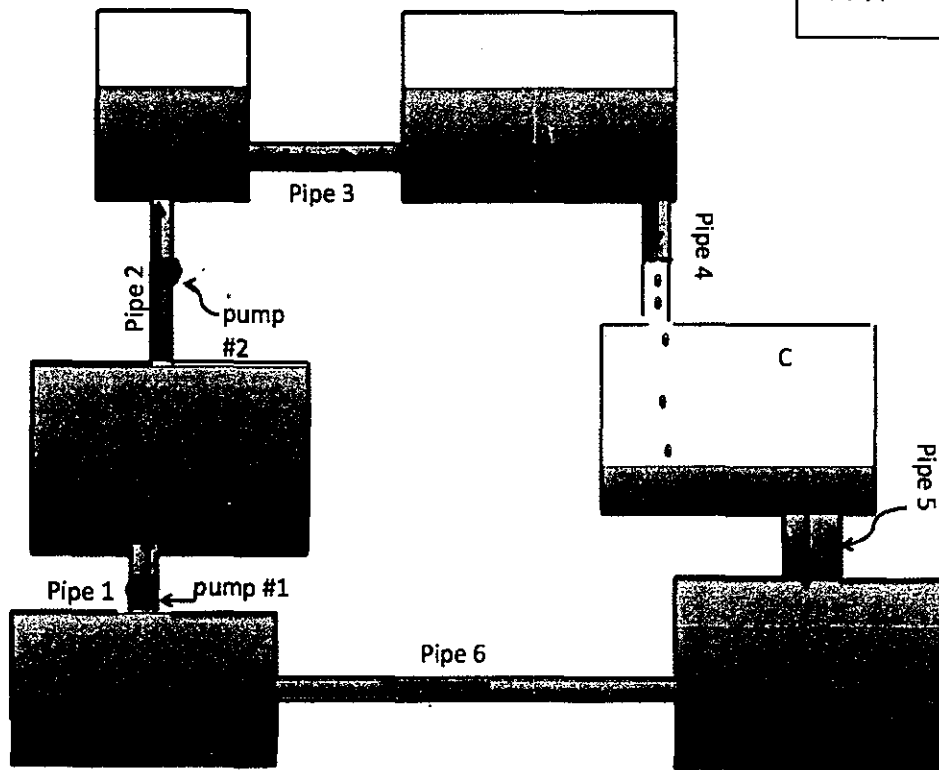
Grav Pot. Energy would increase. The water would just sit in reservoirs and the cycle would stop. Droughts may occur.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

GPE would increase - Droughts will occur.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Temperature would decrease in the water. More thermal energy would be needed for evaporation to occur.



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Gravitational kinetic → Gravitational kinetic →	Pumping water into a lake/reservoir	Gravitational kinetic → Gravitational Potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Chemical kinetic	Condensation	Chemical (Potential) energy Thermal (kinetic) energy
Pipe 4		Precipitation	Gravitational (Potential) → Gravitational (kinetic)
Pipe 5		Infiltration of surface water into ground	Gravitational (kinetic) → Gravitational (kinetic)
Pipe 6		Discharge of ground-water into streams	Gravitational (kinetic) → Gravitational (kinetic)

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: ~~Moving energy~~ Stored energy

Kinetic energy: Moving energy

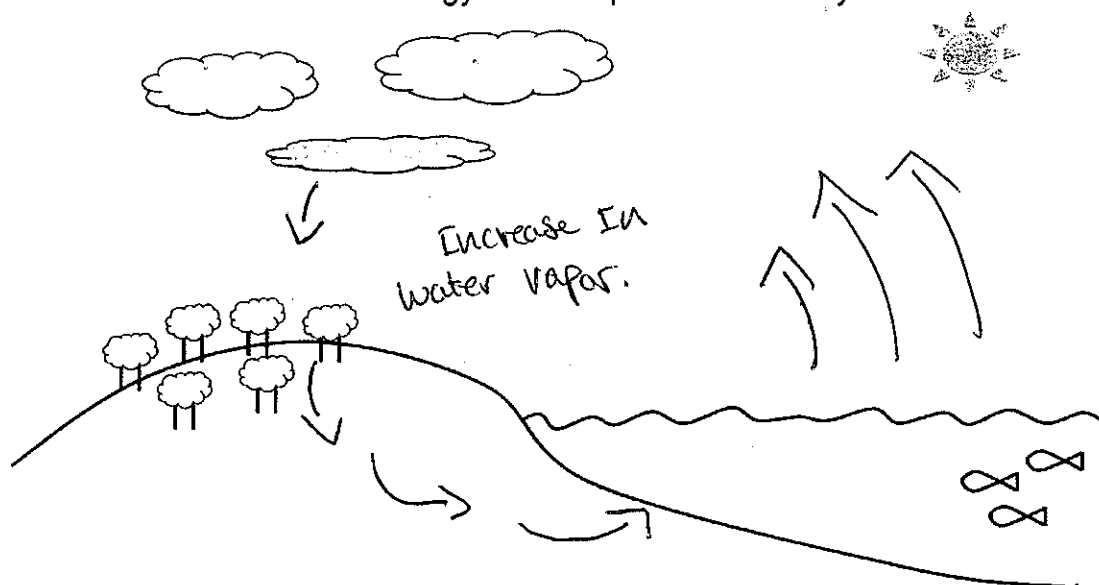
Gravitational energy: energy moving objects together

Thermal energy: Heat energy

Chemical energy: ~~energy~~ energy Between Bonds

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

Gravitational Potential energy of water would decrease because there would be less water vapor in the atmosphere, meaning less condensation, precipitation, and more water in reservoirs so less space for movement.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

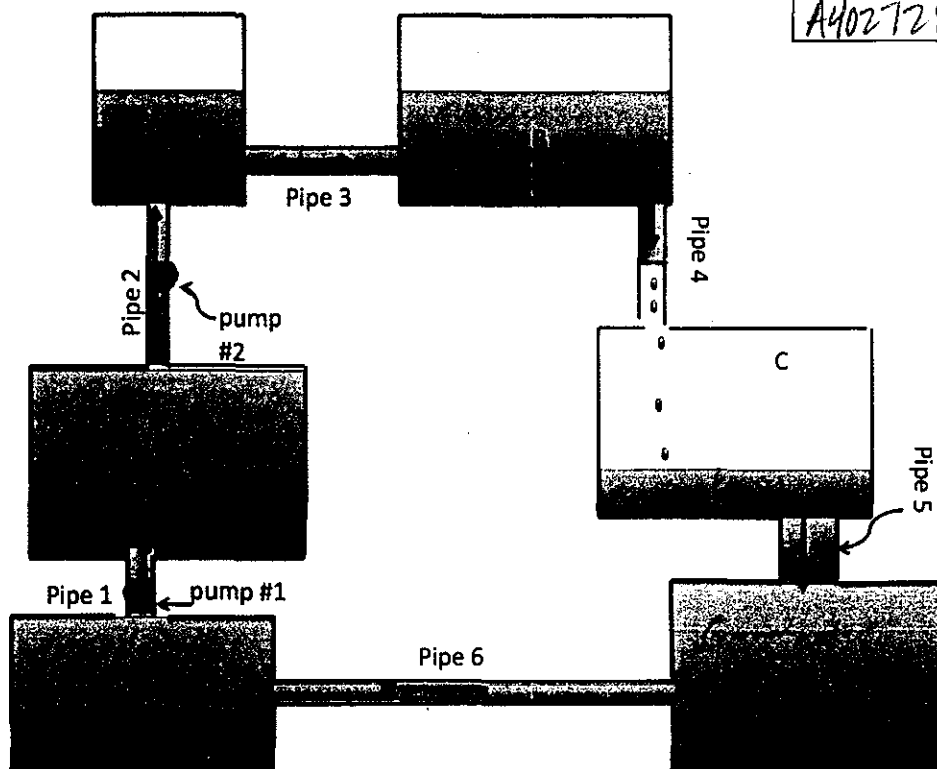
There would no longer be a cycle.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

~~For~~ it would slow down the water cycle meaning the potential energy would decrease.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #:
Student IDs of Members Present:
A42257459
A41860512
A40272860
A40749278



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Gravitational Kinetic \rightarrow Gravitational Potential	Pumping water into a lake/reservoir	Gravitational Kinetic \rightarrow Gravitational Potential
Pipe/Pump 2	Gravitational Potential \rightarrow Kinetic to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Thermal Kinetic \rightarrow Chemical Potential	Condensation	Chemical Kinetic \rightarrow Thermal Potential
Pipe 4	Thermal Kinetic \rightarrow Gravitational Potential	Precipitation	Gravitational Potential \rightarrow Gravitational Kinetic
Pipe 5	Gravitational Potential \rightarrow Gravitational Kinetic	Infiltration of surface water into ground	Gravitational Kinetic \rightarrow Gravitational Potential
Pipe 6	Gravitational Potential \rightarrow Gravitational Kinetic	Discharge of ground-water into streams	Gravitational Kinetic \rightarrow Gravitational Potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *The energy stored in an object*

Kinetic energy: *The energy of movement*

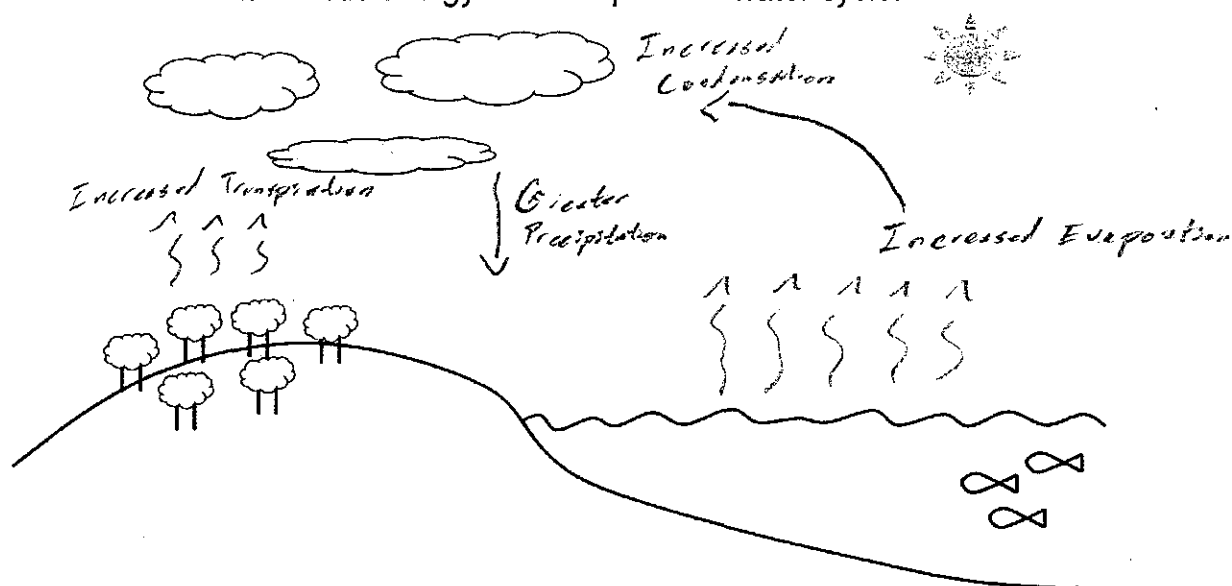
Gravitational energy: *Energy of attraction between objects*

Thermal energy: *Heat energy*

Chemical energy: *The energy of bonds and molecular arrangement*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There would be an increase of gravitational potential.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

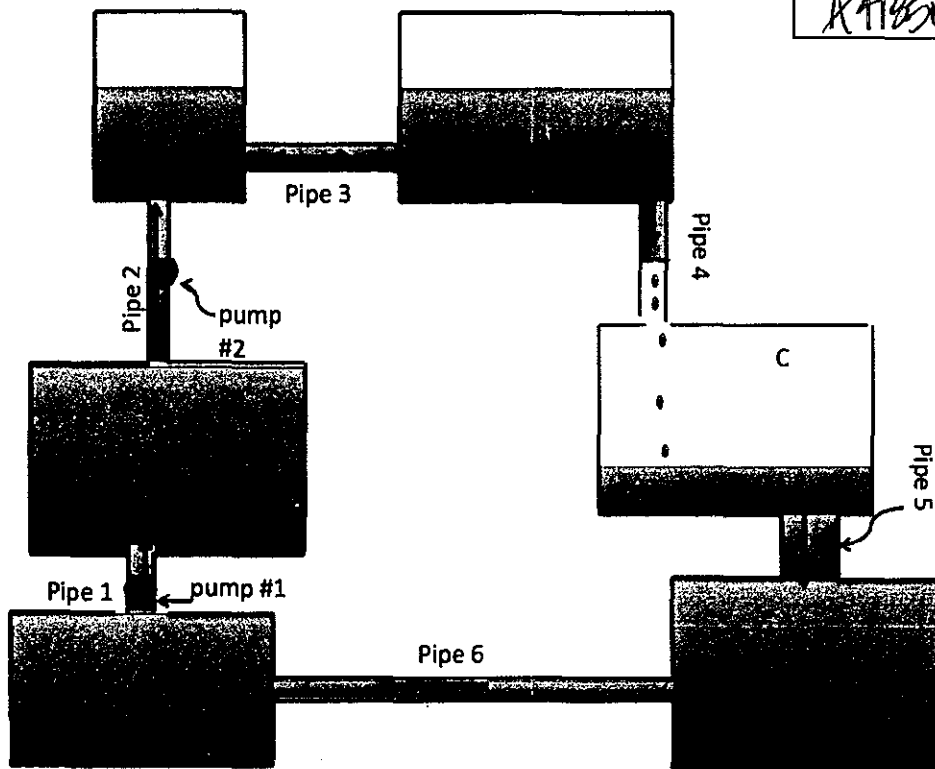
If evaporation stopped, energy would not be used in the bond-breaking of water and the thermal energy would increase.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

The melting of ice would give off thermal energy

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 20
Student IDs of Members Present:
A4191800 A43332855
A42213991
A41850885



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic (electrons) → Gravitational Potential	Pumping water into a lake/reservoir	Kinetic (electrons) → Gravitational Potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Kinetic (electrons) → Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy Potential
Pipe 3	Kinetic (electrons) → Kinetic (water)	Condensation	Chemical Potential → Thermal Kinetic
Pipe 4	Gravitational Potential → Gravitational Kinetic	Precipitation	Gravitational Potential → Gravitational Kinetic
Pipe 5	Gravitational Potential → Gravitational Kinetic	Infiltration of surface water into ground	Gravitational Potential → Gravitational Kinetic
Pipe 6	Gravitational Potential → Gravitational Kinetic	Discharge of ground-water into streams	Gravitational Kinetic → Gravitational Potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *Energy stored*

Kinetic energy: *movement of energy*

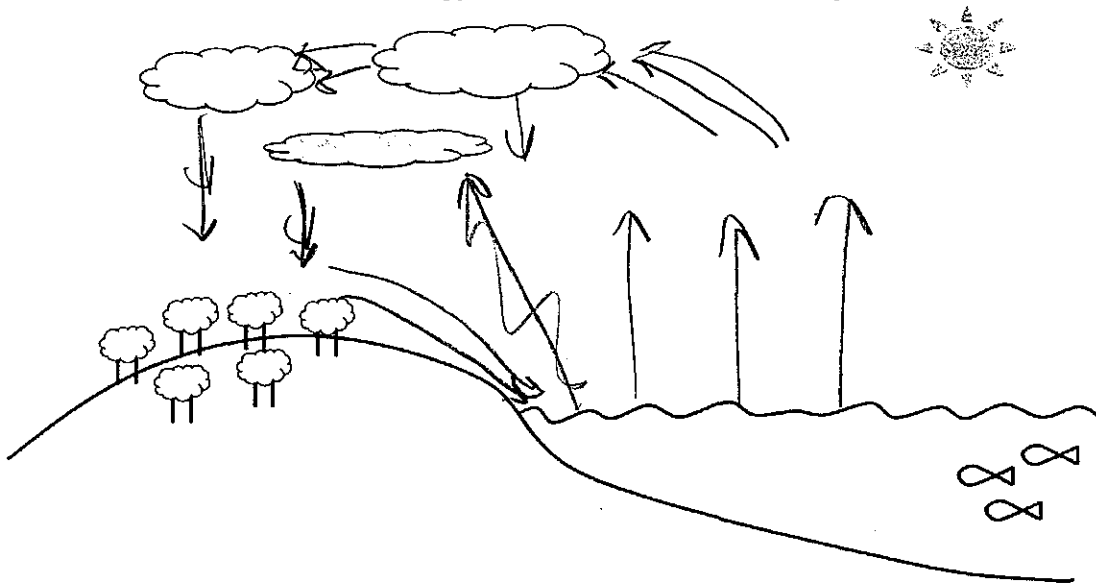
Gravitational energy: *attraction of energy*

Thermal energy: *heat, movement of molecules*

Chemical energy: *breaking bonds*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

It decreases the gravitational potential

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

It would decrease and eventually stop

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would speed up the energy in the water cycle

ISP203A – Global Change, Energy
Part 2: Group Work

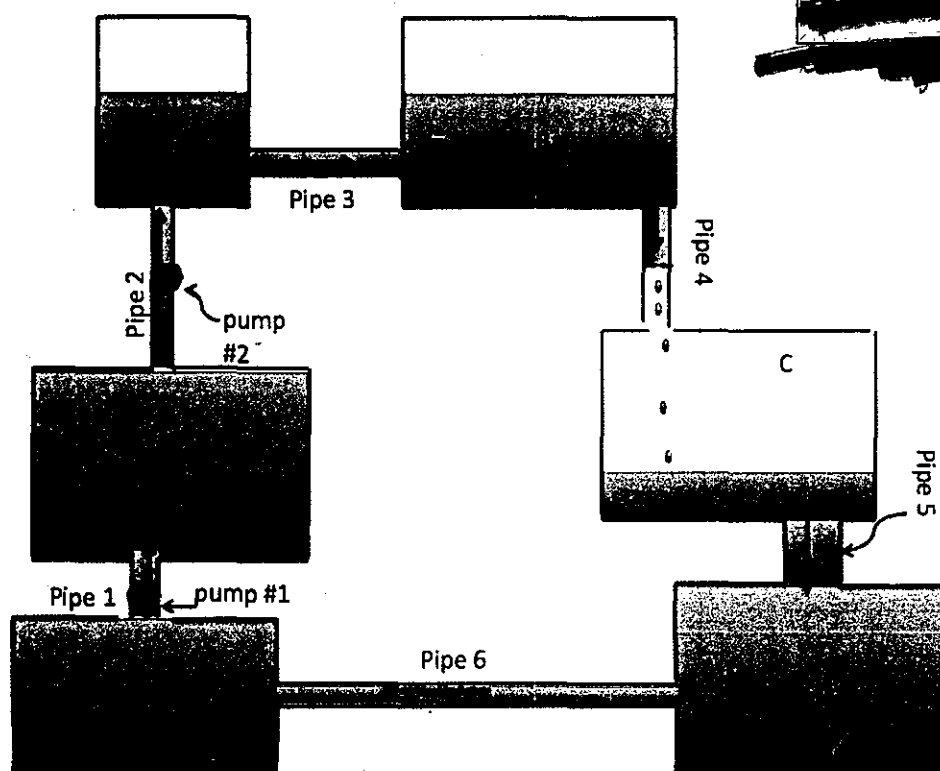
GROUP #: 21
Student IDs of Members Present:

A43535121

A42271052

A42052431

A36629634



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	electronic / Kinetic Gravitational Potential	Pumping water into a lake/reservoir	Gravitational - Potential Gravitational - Kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (Kinetic) energy
Pipe 3	Kinetic electrons Kinetic water	Condensation	Thermal - Kinetic Chemical - Potential
Pipe 4	Gravitational Potential Gravitational Kinetic	Precipitation	Gravitational - Potential Gravitational - Kinetic
Pipe 5	Gravitational Potential Gravitational Kinetic	Infiltration of surface water into ground	Gravitational - Potential Gravitational - Kinetic
Pipe 6	Gravitational Potential Gravitational Kinetic	Discharge of groundwater into streams	Gravitational - Potential Gravitational - Kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *Stored energy*

Kinetic energy: *Moving energy*

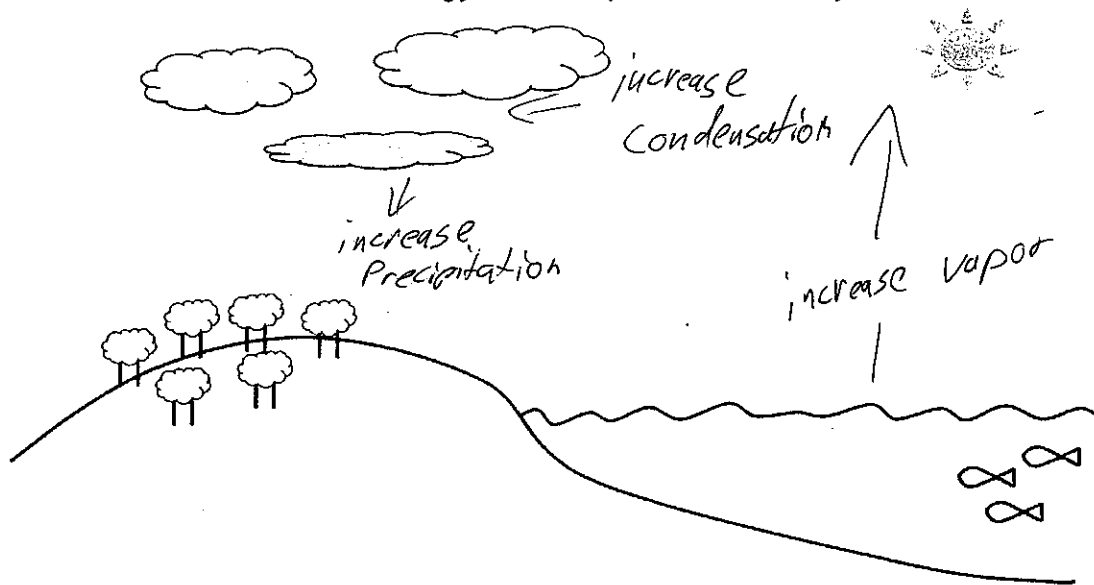
Gravitational energy: *energy that attracts other objects*

Thermal energy: *energy of moving molecules or atoms*

Chemical energy: *energy required to break or form bonds*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

Less vapor - less condensation - less precipitation

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

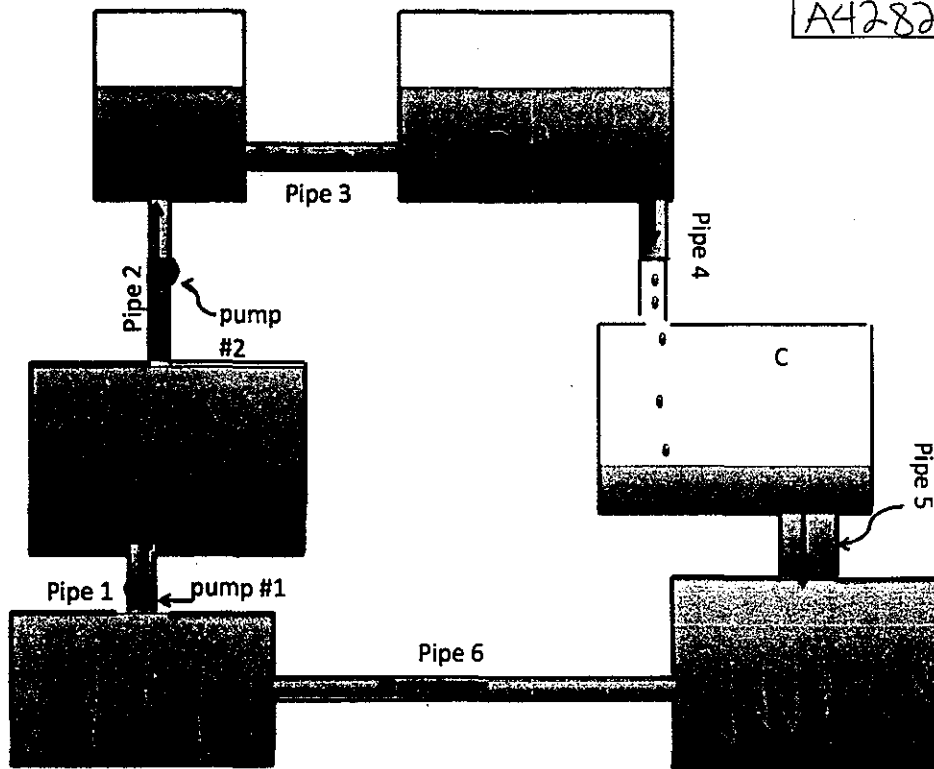
Earth would heat up

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Slow the water cycle. etc

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 22
Student IDs of Members Present:
 A37669797 A41729348
 A42839439
 A42829869



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic (electrons) → Potential	Pumping water into a lake/reservoir	Kinetic → potential
Kinetic → Pipe/Pump 2	Gravitational Potential → Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) → gravitational potential	Condensation	Chemical potential → thermal kinetic
Pipe 4	gravitational potential → gravitational kinetic	Precipitation	gravitational potential → gravitational kinetic
Pipe 5	gravitational potential → gravitational kinetic	Infiltration of surface water into ground	
Pipe 6	Gravitational potential → gravitational kinetic	Discharge of ground-water into streams	Potential → kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: Energy stored ~~being~~ ready for use when an object is still

Kinetic energy: Energy when object is moving

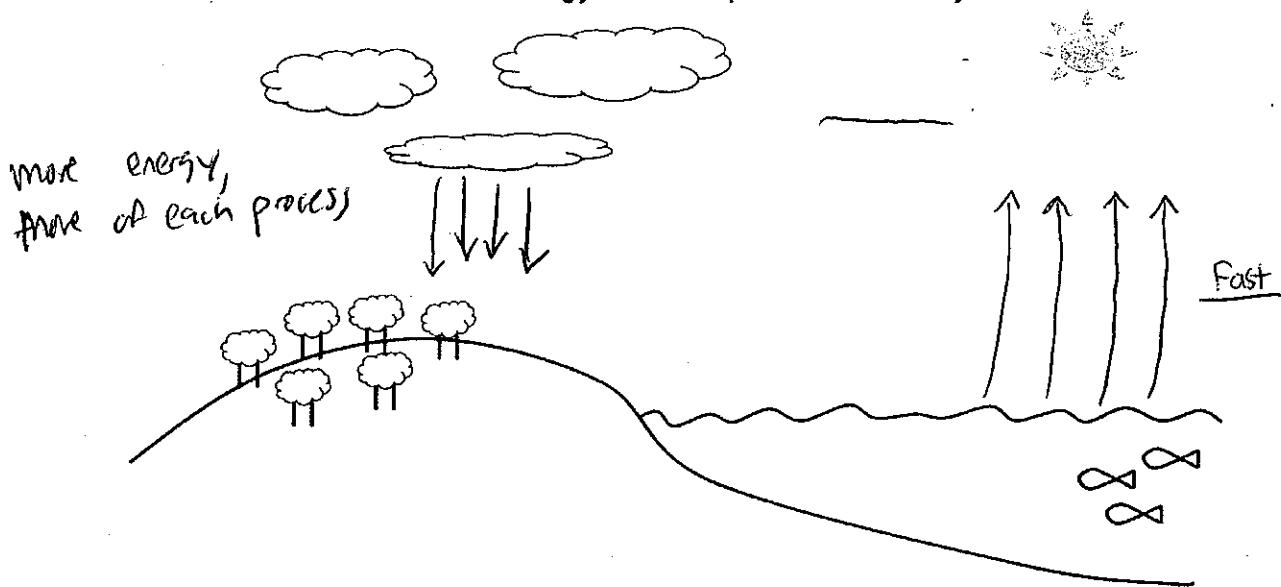
Gravitational energy: energy on earth for things rising / falling

Thermal energy: energy from atoms colliding

Chemical energy: energy that can be used to change phases.

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

The gravitational potential would decrease because ~~molecules move slower~~ in ~~cold temperatures~~ there would be less evaporation / precipitation with cold temperatures (less energy in the system).

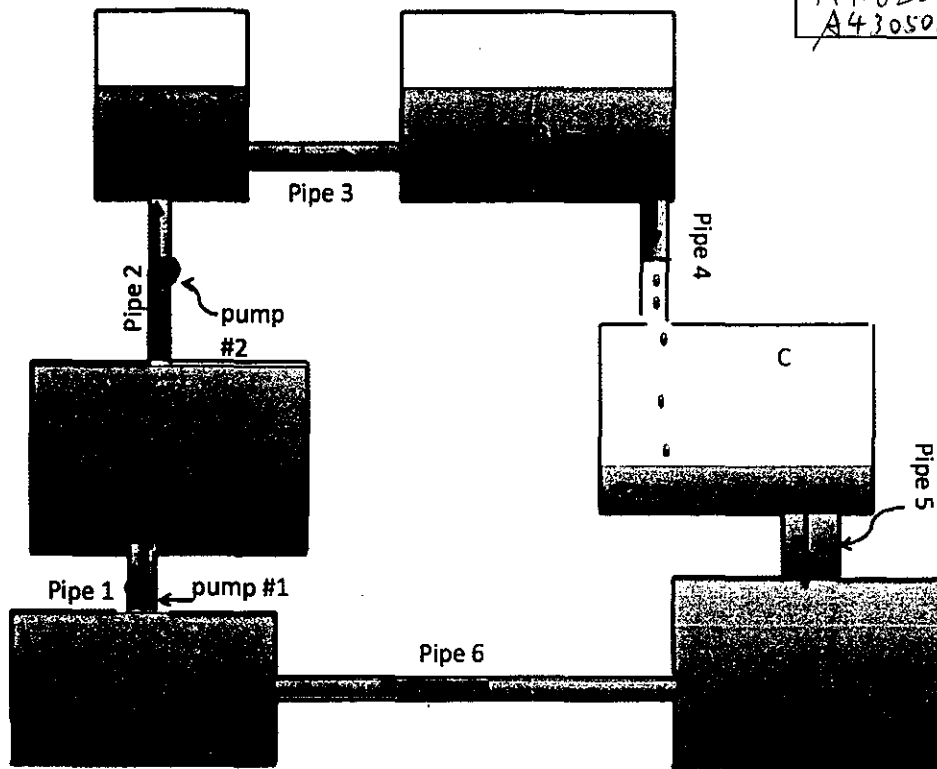
D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Energy would decrease because evaporation requires energy.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

It would take more energy for evaporation.

GROUP #: 23
Student IDs of Members Present:
 A39474585
 A39232455
 A41823312
 A43050270



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	grav pot \rightarrow grav Kin. Kinetic	Pumping water into a lake/reservoir	grav pot \rightarrow grav. Kin
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kin electrons \rightarrow Kin H ₂ O Potential	Condensation	Chem pot \rightarrow Thermal Kin
Pipe 4	grav pot. \rightarrow grav Kin	Precipitation	grav pot \rightarrow grav Kin
Pipe 5	grav pot \rightarrow grav Kin	Infiltration of surface water into ground	grav pot \rightarrow grav Kin
Pipe 6	grav pot \rightarrow grav Kin	Discharge of ground-water into streams	grav pot \rightarrow grav Kin

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy which can be converted into kinetic energy

Kinetic energy: energy acquired from movement

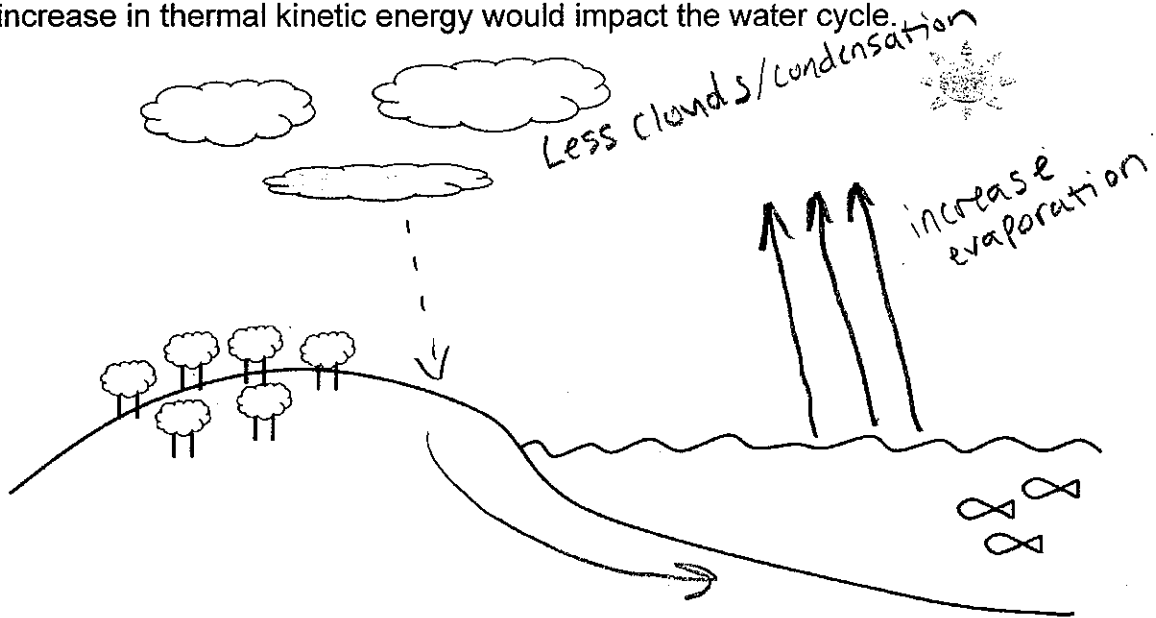
Gravitational energy: energy achieved due to mutual attractions between objects

Thermal energy: energy due to heat from moving molecules

Chemical energy: energy due to changing molecule arrangements

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

Condensation would increase so gravitational potential of water would also increase

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

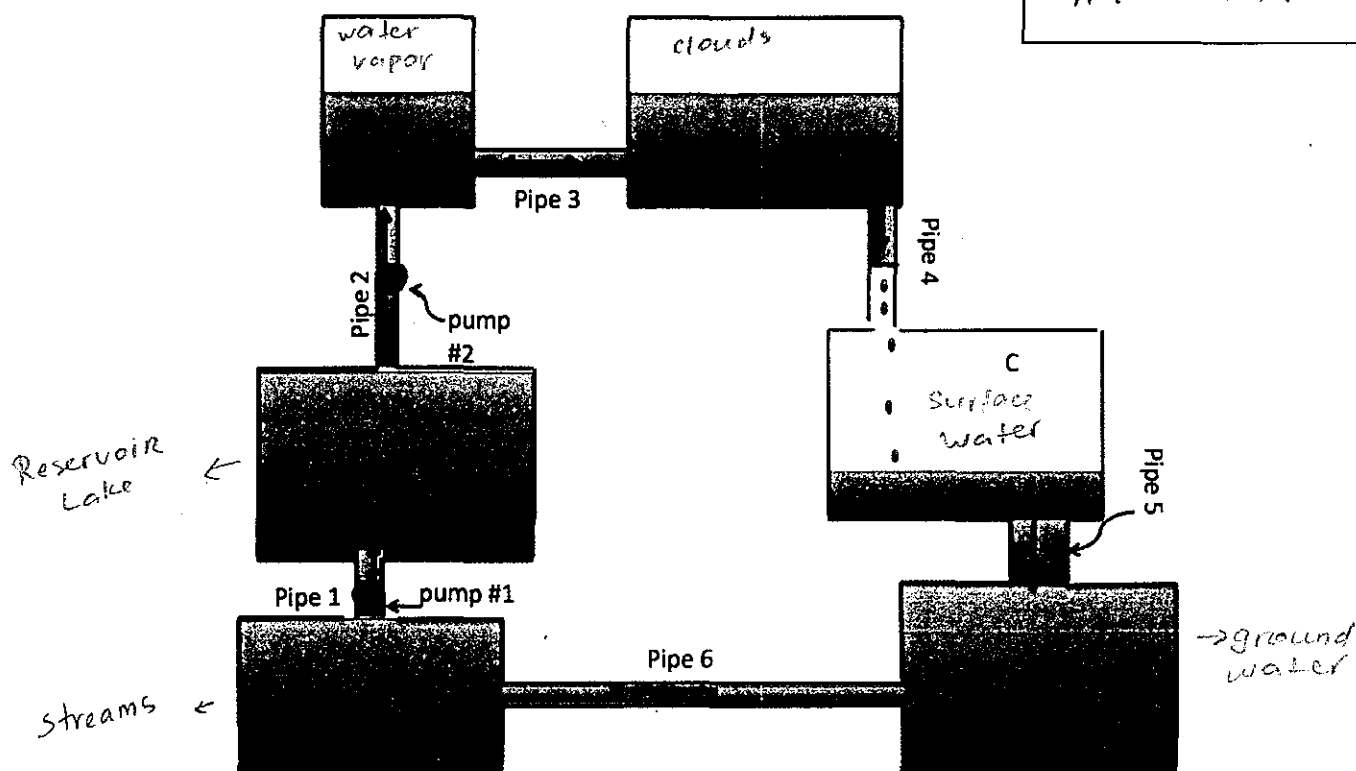
If evaporation stopped there would be no input of water to the atmosphere decreasing chemical potential energy in the atmosphere.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Evaporation would occur less causing the changes from kinetic (electrons) → grav pot. energy and thermal kinetic → chemical pot. to happen less often

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 24
Student IDs of Members Present:
A43091747 A41136895
A40208496



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Grav. Potential \rightarrow Grav. Kinetic	Pumping water into a lake/reservoir	Grav. Kinetic \rightarrow Grav. Potential
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) \rightarrow kinetic (water)	Condensation	Chemical potential \rightarrow Thermal kinetic
Pipe 4	Grav. potential \rightarrow Grav. Kinetic	Precipitation	Grav. potential \rightarrow Grav. Kinetic
Pipe 5	Grav. kinetic \rightarrow Grav. Potential	Infiltration of surface water into ground	Grav. Kinetic \rightarrow Grav. Potential
Pipe 6	Grav. kinetic \rightarrow Grav. Potential	Discharge of ground-water into streams	Grav. Kinetic \rightarrow Grav. Potential

Kinetic (electrons) to Grav. potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: energy stored in a body due to position or arrangement of its

Kinetic energy: energy of movement

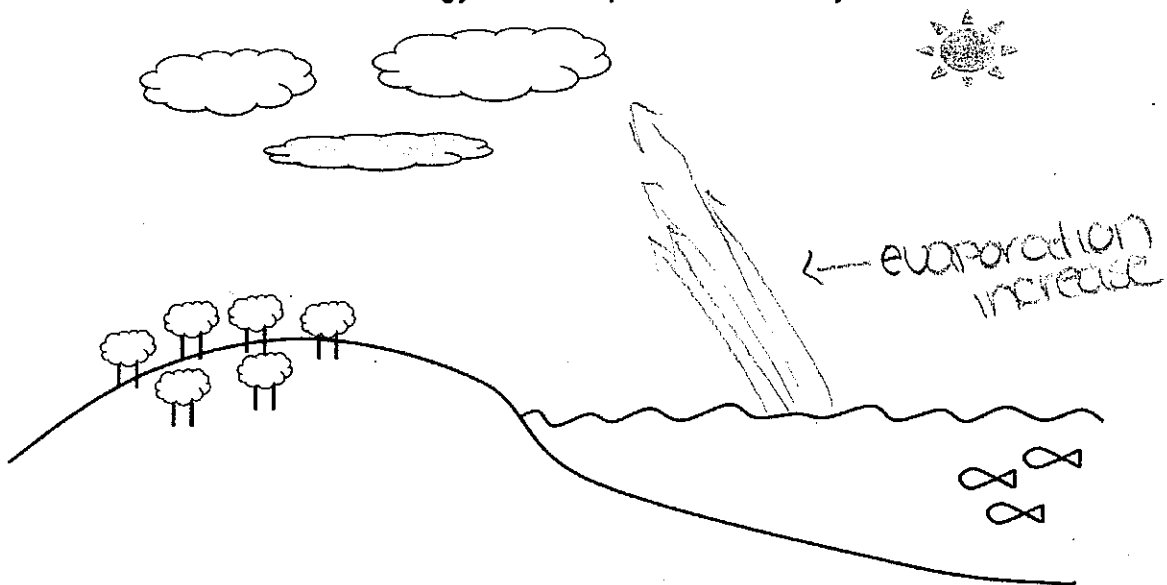
Gravitational energy: the energy that draws objects together

Thermal energy: energy of a body that results from movement of molecules in

Chemical energy: the energy that is due to arrangement of atoms & molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

less chemical potential energy

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

*no rainfall
doesn't leave surface water
longer residence time*

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

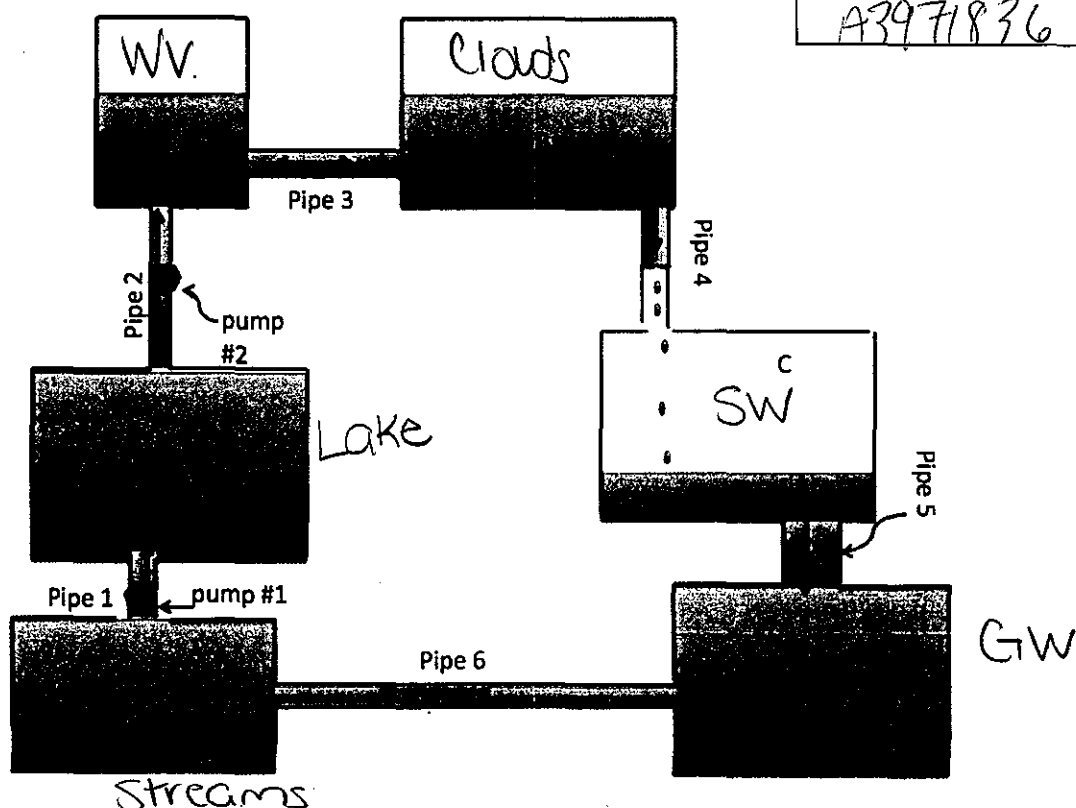
*thermal energy would be cooler in water
resulting in cooler temperatures in atmosphere*

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #:

Student IDs of Members Present:

A41456018 A37620497
A43490816
A3971836



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic \rightarrow Gravitational Potential	Pumping water into a lake/reservoir	Thermal Kinetic \rightarrow Chemical potential
Pipe/Pump 2	Gravitational Potential \rightarrow Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic \rightarrow Kinetic	Condensation	Chemical potential \rightarrow Thermal Kinetic
Pipe 4	Grav. Potential \rightarrow Grav. Kinetic	Precipitation	Gravitational \rightarrow Gravitational Kinetic
Pipe 5	Gravitational Kinetic \rightarrow Grav. Potential	Infiltration of surface water into ground	Grav. Potential \rightarrow Grav. Kinetic
Pipe 6	Kinetic \rightarrow Gravitational Potential	Discharge of ground-water into streams	Grav. Kinetic \rightarrow Thermal Potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: energy stored by an object

Kinetic energy: energy an object has due to motion

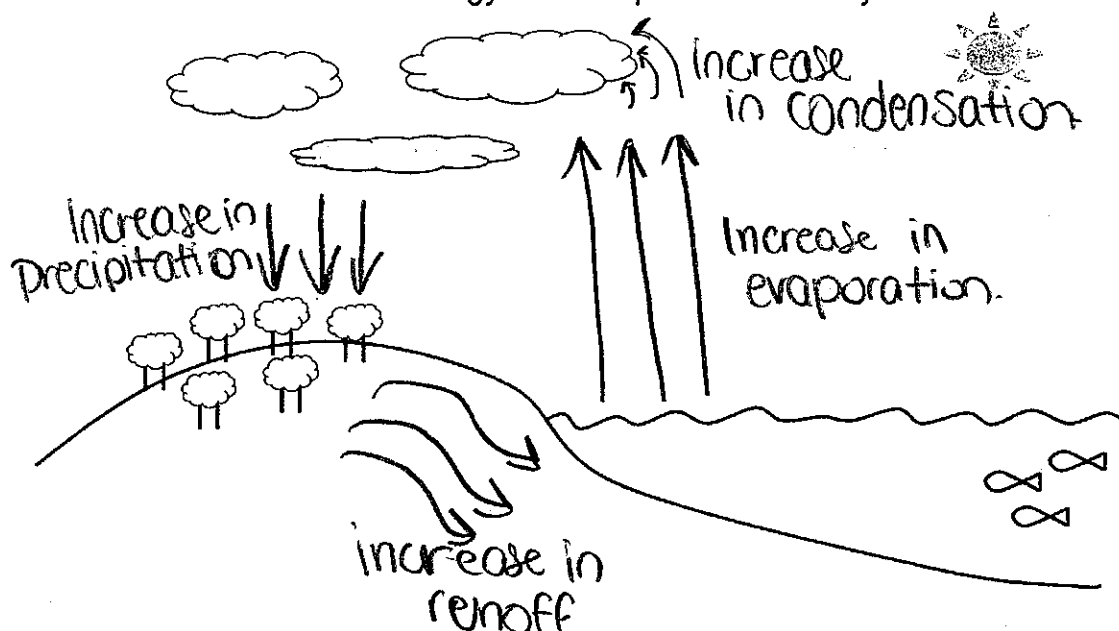
Gravitational energy: Force that attracts material to other matter

Thermal energy: movement of atoms and molecules.

Chemical energy: Chemical substance going through a transformation or chemical reaction.

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

There would be greater gravitational potential.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

There would be an increase in thermal potential energy.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

There would be more thermal energy needed.

Part 2: Group Work

GROUP #: 26

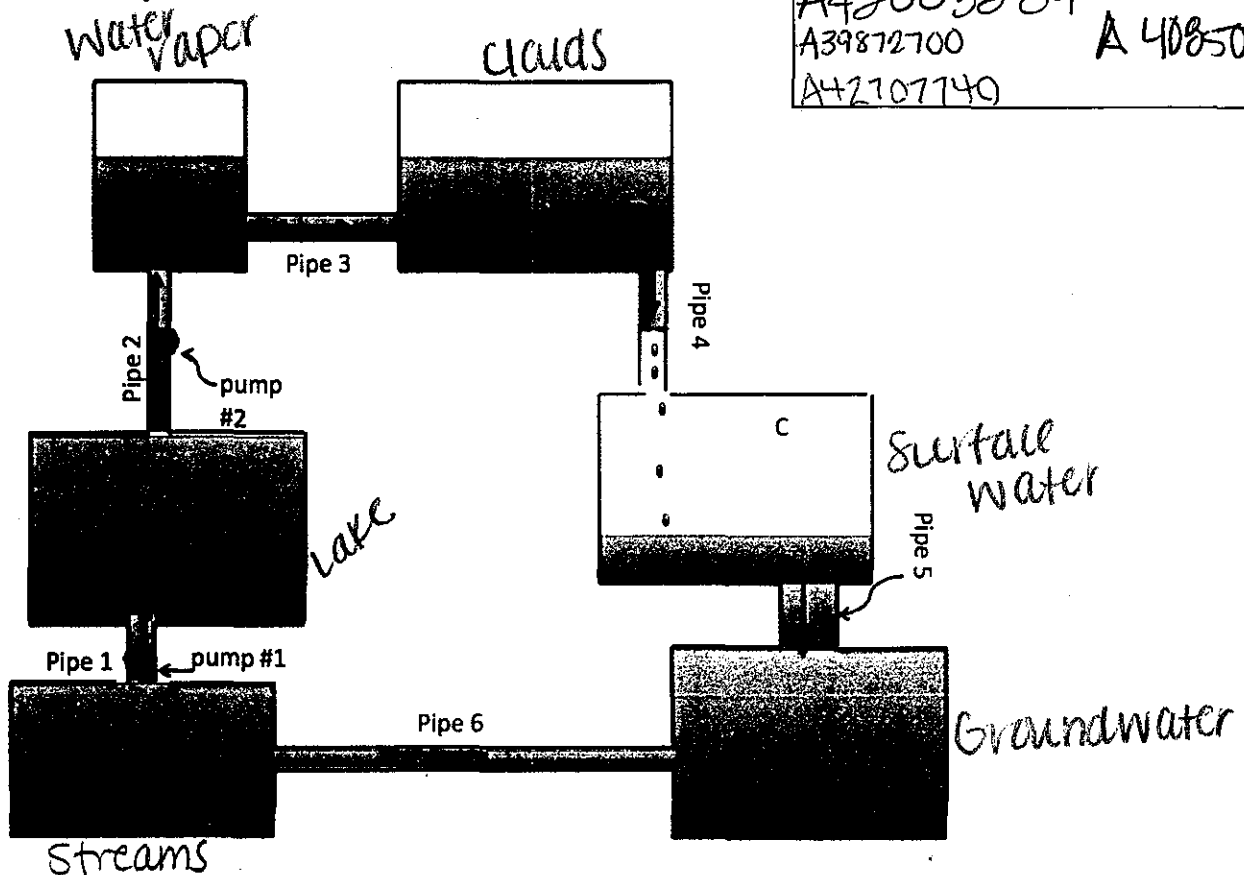
Student IDs of Members Present:

A42003289

A39872700

A 40850791

A42107740



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	potential → kinetic	Pumping water into a lake/reservoir	gravitational potential → gravitational kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (potential) energy
Pipe 3	Kinetic (electrons) → kinetic (water)	Condensation	Chemical potential → thermal kinetic
Pipe 4	potential → kinetic	Precipitation	gravitational potential → gravitational kinetic
Pipe 5	potential → kinetic	Infiltration of surface water into ground	gravitational potential → gravitational kinetic
Pipe 6	potential → kinetic	Discharge of ground-water into streams	gravitational potential → gravitational kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: *Stored energy (nonmoving)*

Kinetic energy: *Moving energy*

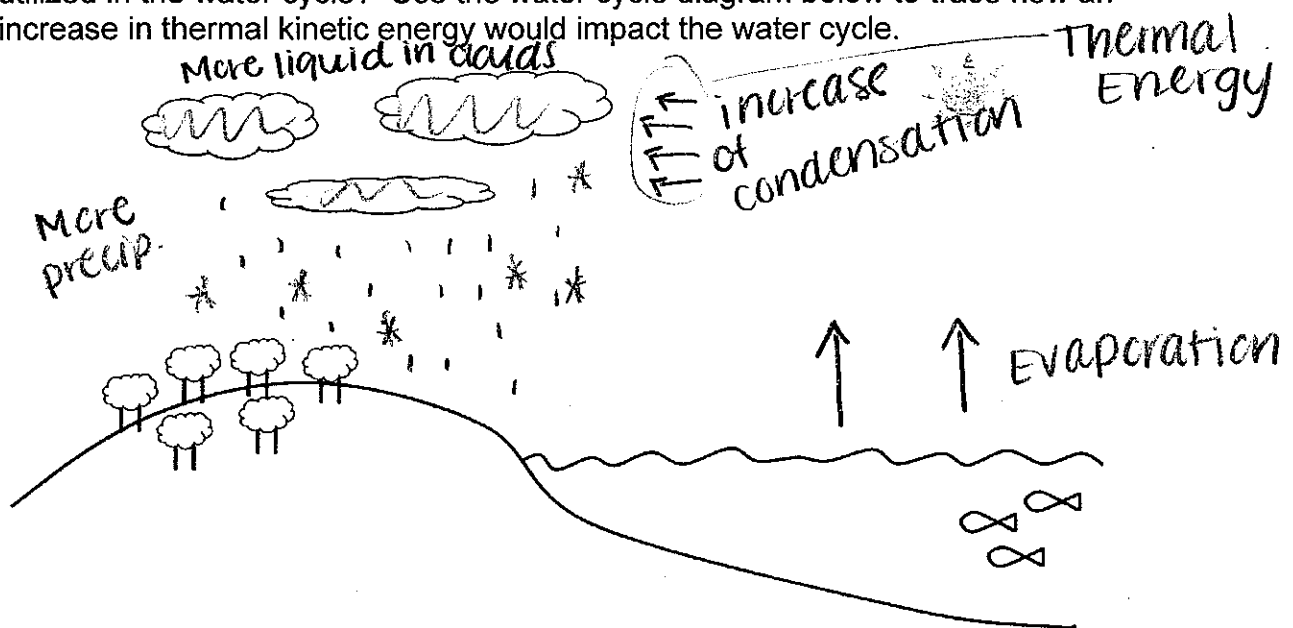
Gravitational energy: *Energy that pulls/attracts objects*

Thermal energy: *Energy from molecule movement*

Chemical energy: *Energy from molecule/atom arrangement*

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

Less thermal = less condensation = less precipitation

Less precipitation means decrease of gravitational potential (prior to falling)

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

No evaporation would create a decrease of thermal kinetic energy which would eventually lead to disruption/stop of the entire water cycle.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Increase of thermal energy

Part 2: Group Work

GROUP #: 27

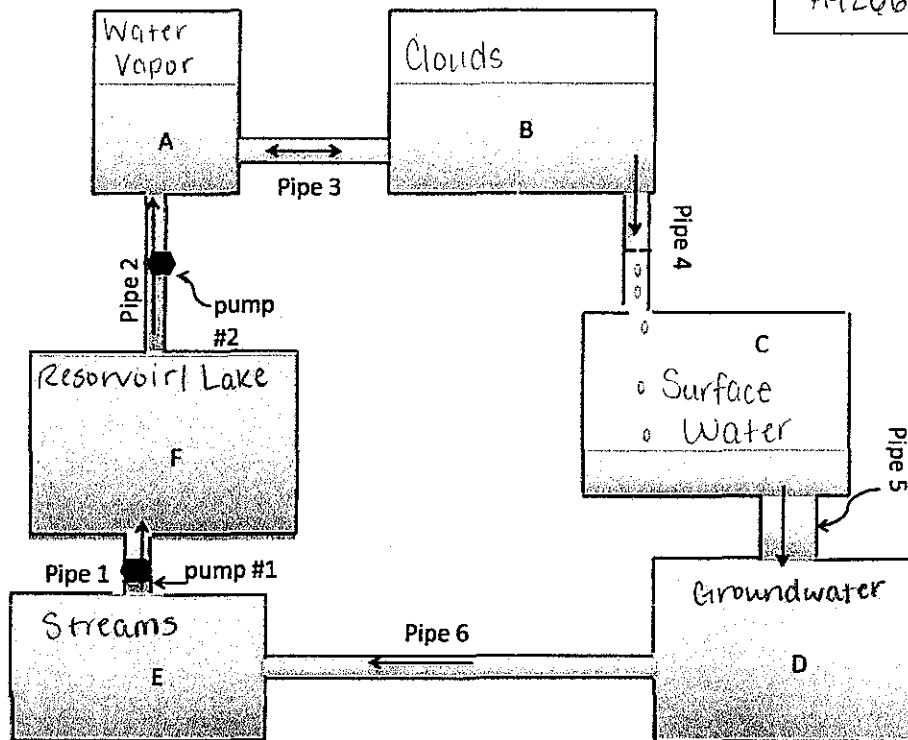
Student IDs of Members Present:

A40967142

A42422216

A42704999

A42669614



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Kinetic (electrons) → Gravitational potential	Pumping water into a lake/reservoir	Gravitational potential → Gravitational Kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) → Kinetic (water)	Condensation	Chemical potential → Thermal Kinetic
Pipe 4	Gravitational potential → Gravitational kinetic	Precipitation	Gravitational potential → Gravitational Kinetic
Pipe 5	Grav. potential → Grav. Kinetic	Infiltration of surface water into ground	Gravitational potential → Gravitational Kinetic
Pipe 6	Grav. potential → Grav. Kinetic	Discharge of ground-water into streams	Gravitational potential → Gravitational Kinetic

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy due to movement

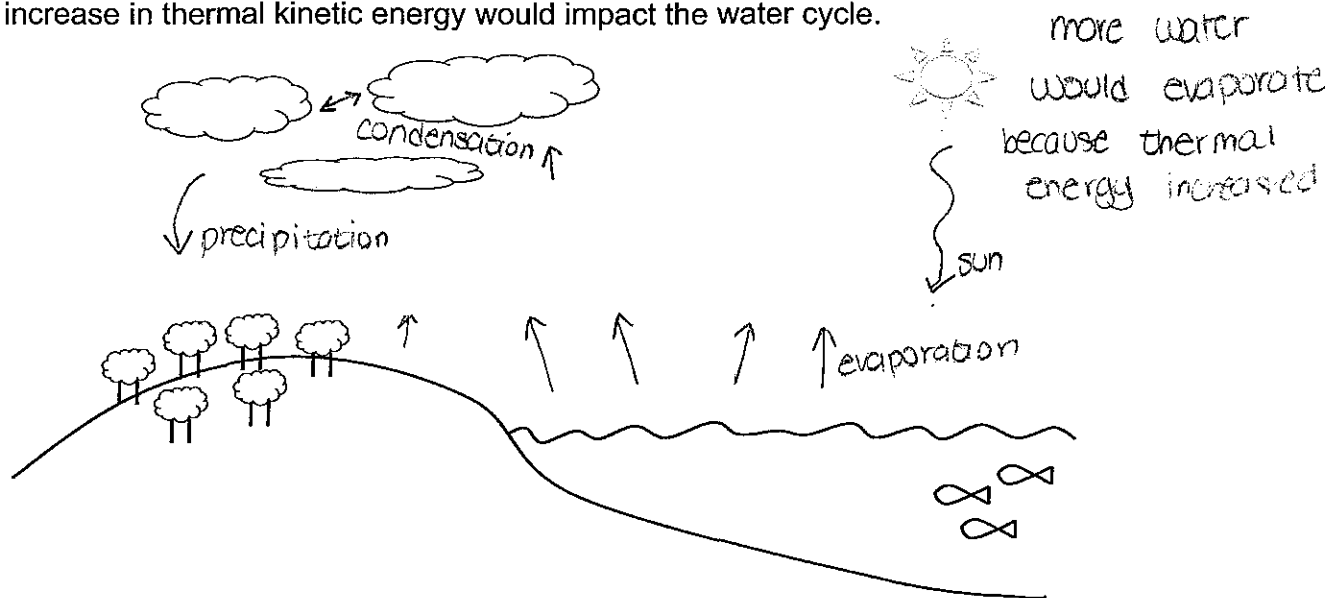
Gravitational energy: energy that draws objects together

Thermal energy: energy due to motion of molecules

Chemical energy: energy due to arrangement of molecules & bonds

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

more water would precipitate than evaporate because there is less thermal heat

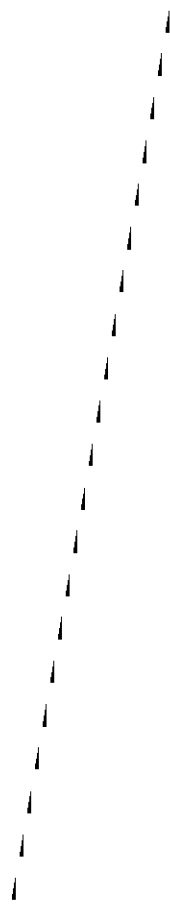
D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

No water vapor → nothing to condense → no precipitation
chemical energy would decrease

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

There would not be enough thermal energy for evaporation

22



Part 2: Group Work

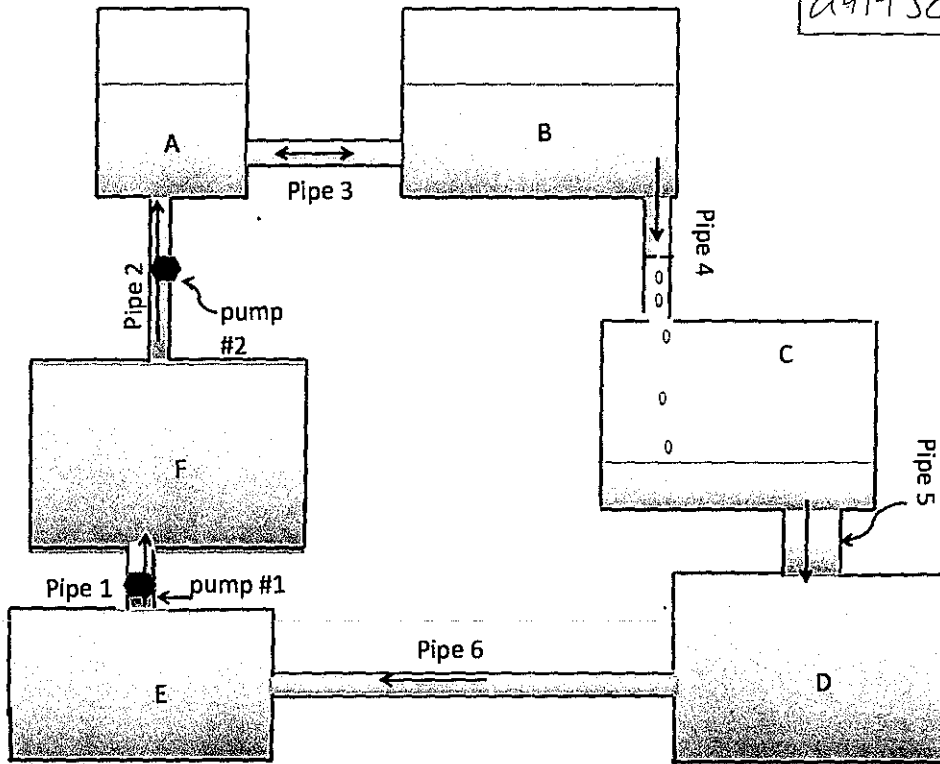
GROUP #: 28

Student IDs of Members Present:

A46678097 A41836115

A43836396

A41930966



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor; Container B=Clouds; Container C=Surface Water; Container D=Groundwater; Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	Gravitational kinetic → Kinetic (electrons) →	Pumping water into a lake/reservoir	Gravitational kinetic →
Pipe/Pump 2	Gravitational Potential to Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) → kinetic water	Condensation	Chemical pot → thermal kin
Pipe 4	Gravit. pot → gravit. kin	Precipitation	Gravit pot. → gravit kin.
Pipe 5	Gravit pot → gravit. kin.	Infiltration of surface water into ground	Gravit pot → gravit. kin
Pipe 6	Gravit pot → gravit kin	Discharge of ground- water into streams	Gravit pot → gravit kin

2

ISP203A – Global Change
Energy

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy in motion

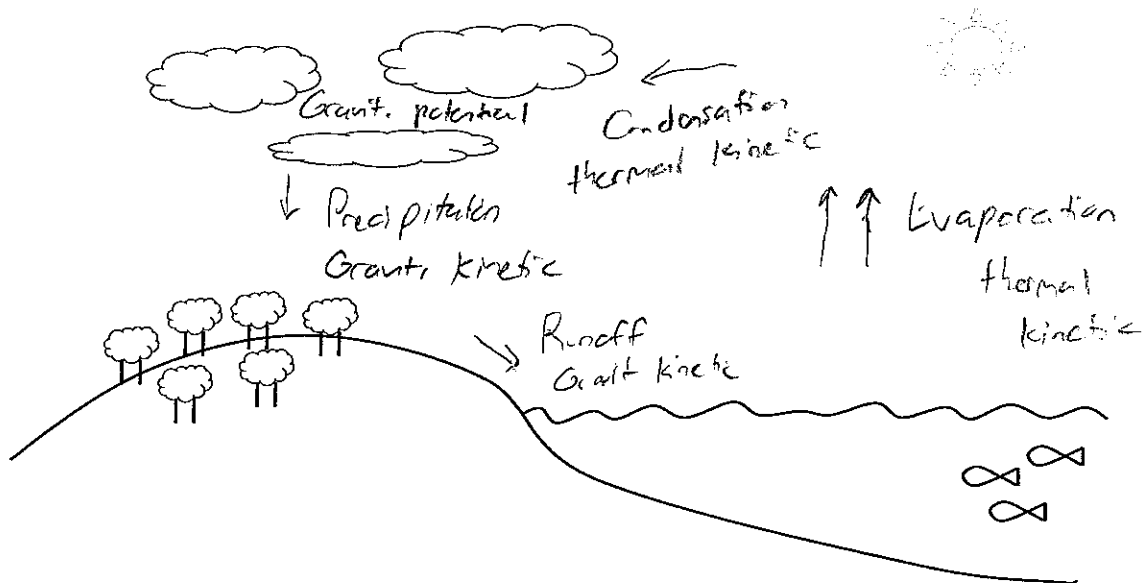
Gravitational energy: energy caused by gravity

Thermal energy: energy caused by temperature change - molecule movement

Chemical energy: energy caused by chemical change - molecule arrangement

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

Thermal energy is needed for condensation, so that would decrease which would affect precipitation.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

No evaporation would result in no water in the atmosphere, which would decrease precipitation & water would end up

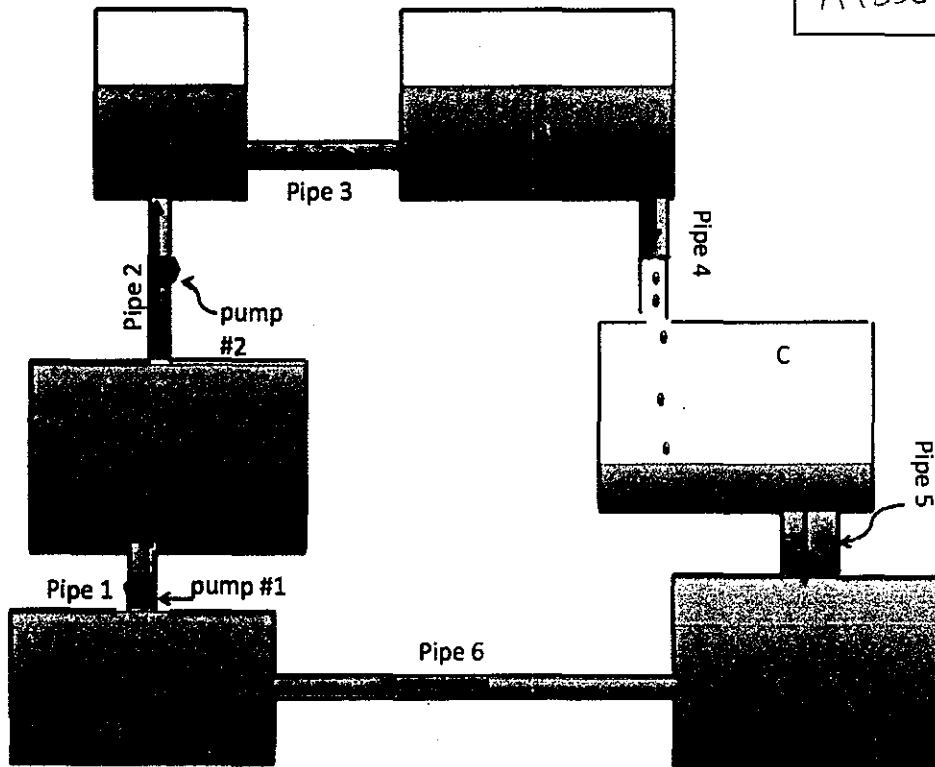
sitting in the same place

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Evaporation would decrease, although the temperature of the water would increase

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 29
Student IDs of Members Present:
 A42672148
 A42515239
 A43303247
 A39112932



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

Simple system	Energy Converted	Water cycle	Energy Converted
Pipe/Pump 1	gravitational potential → gravitational kinetic	Pumping water into a lake/reservoir	gravitational potential → gravitational kinetic
Pipe/Pump 2	Gravitational Potential to Gravitational kinetic kinetic (electrons) → potential	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	kinetic (electrons) → kinetic (water)	Condensation	chemical potential → thermal kinetic
Pipe 4	gravitational potential → gravitational kinetic	Precipitation	gravitational potential → gravitational kinetic
Pipe 5	gravitational potential → gravitational kinetic	Infiltration of surface water into ground	gravitational potential → gravitational kinetic
Pipe 6	gravitational potential → gravitational kinetic	Discharge of ground-water into streams	gravitational potential → gravitational kinetic

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: stored energy

Kinetic energy: energy as it moves

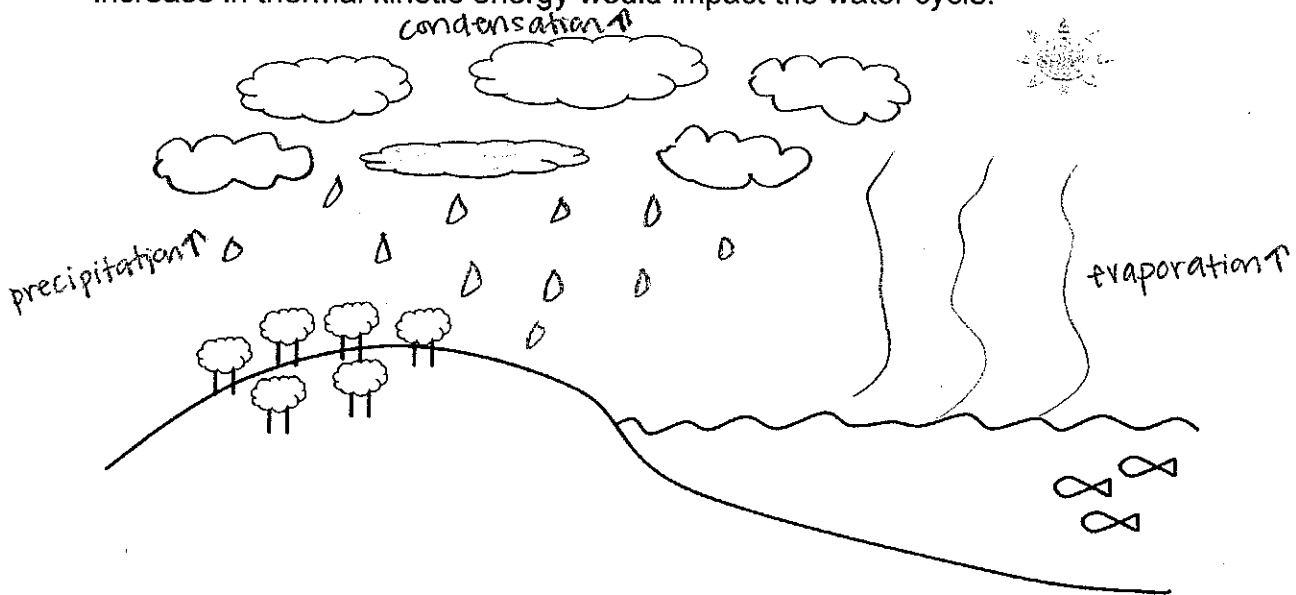
Gravitational energy: energy flowing between objects without changing forms

Thermal energy: energy from moving molecules

Chemical energy: energy from within the makeup of the object

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere.

Describe how this might affect the gravitational potential of water in the atmosphere.

There would be less condensation in the atmosphere therefore there would be less precipitation, decreasing the amount of gravitational potential of water in the atmosphere.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

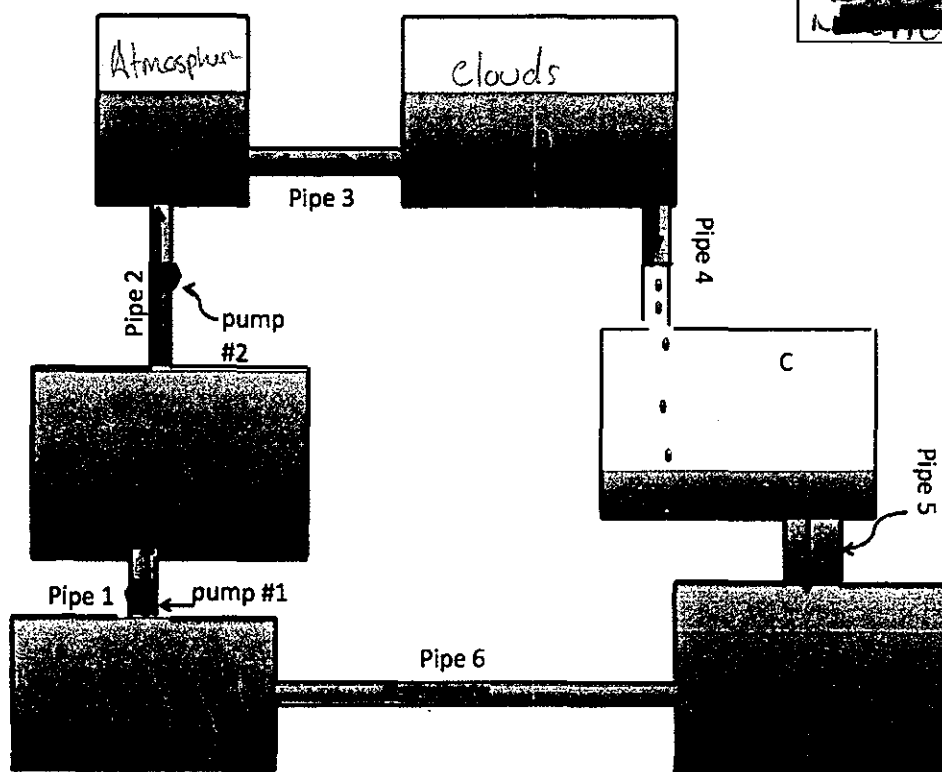
There would be less gravitational potential energy because without evaporation less energy would be stored in atmosphere.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

there wouldn't be as much evaporation so there isn't as much precipitation which decreases the amount of gravitational and thermal energy.

ISP203A – Global Change, Energy
Part 2: Group Work

GROUP #: 30
Student IDs of Members Present:
 A43425519
 A42894705
 A41387501
 Lizcano A44266728



Consider the diagram above; this should be familiar from last week's activity on RESERVOIRS. Remember the analogy: Container A=Water Vapor, Container B=Clouds; Container C=Surface Water, Container D=Groundwater, Container E=Streams; Container F=Reservoir/Lake

Fill in Table B in the same way we filled in Table A together, but with container D now analogous to groundwater. Identify the type of energy being converted for the simple system shown in the diagram above and for the water cycle.

Table B. Aligning the system to the water cycle including groundwater

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Pipe/Pump 1	Gravitational Potential → Gravitational Kinetic	Pumping water into a lake/reservoir	Gravitational Potential → Gravitational Kinetic
Pipe/Pump 2	Gravitational Potential → Gravitational Kinetic	Evaporation	Thermal (kinetic) energy to Chemical (kinetic) energy
Pipe 3	Kinetic (electrons) → Kinetic (water)	Condensation	Chemical → Thermal Kinetic
Pipe 4	Gravitational Potential → Gravitational Kinetic	Precipitation	Gravitational Potential → Gravitational Kinetic
Pipe 5	Gravitational Potential → Gravitational Kinetic	Infiltration of surface water into ground	Gravitational Potential → Gravitational Kinetic
Pipe 6	Gravitational Potential → Gravitational Kinetic	Discharge of ground-water into streams	Gravitational Potential → Gravitational Kinetic

Kinetic (electrons)

Potential

Part 2: Group Work

Group Questions: USE A SEPARATE SHEET AS NEEDED

A. Step back for a moment. In your group's own words, explain the following terms:

Potential energy: Stored energy

Kinetic energy: Energy that causes movement

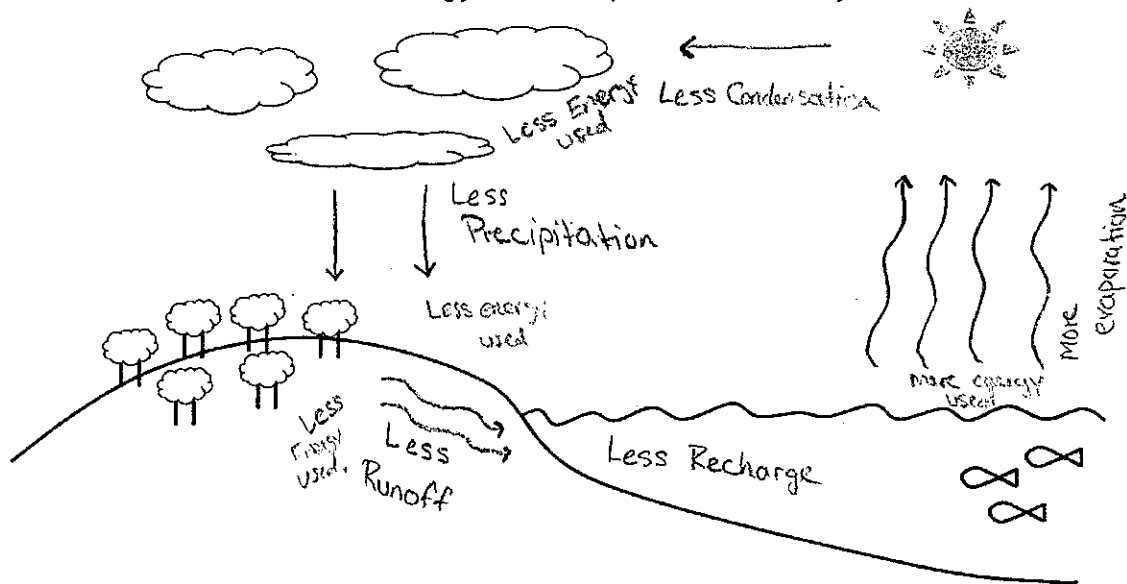
Gravitational energy: Energy that is caused by gravity; it draws object together

Thermal energy: Heat energy that is caused by molecules moving faster.

Chemical energy: Energy caused by arrangement of atoms and molecules

MAKE SURE EVERYONE UNDERSTANDS THESE TERMS BEFORE MOVING ON!

B. If global temperatures increased, how would this change the way in which energy is utilized in the water cycle? Use the water cycle diagram below to trace how an increase in thermal kinetic energy would impact the water cycle.



C. Imagine that there was a significant decrease in thermal energy in the atmosphere. Describe how this might affect the gravitational potential of water in the atmosphere.

With a decrease in thermal energy would make frozen water harder to pull down causing a decrease in gravitational Potential.

D. What would happen to energy in the water cycle if evaporation stopped? This is a thought experiment that will help you test your ability to reason about energy.

Eventually the whole water cycle to stop causing there to be no energy used at all.

E. Imagine the temperature of surface water in Michigan decreases suddenly due to melting of glacial ice in Canada. How would this affect energy in the water cycle?

Water will take more energy out of the air so in order to settle the equilibrium by causing more condensation.